

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

*In re* Patent Application of )  
Daniel R. POTTER, et al. ) Group Art Unit: 3627  
Appln. No.: 10/099,685 ) Examiner: Andrew J. Rudy  
Filed: March 14, 2002 ) Attorney Reference: 005127.00033  
For: CUSTOM FIT SALE OF FOOTWEAR ) Confirmation No.: 4915  
                                      )

**APPEAL BRIEF**

Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Service Window  
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Alexandria, VA 22314

On Behalf of NIKE, Inc.

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Dated: December 19, 2008

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**Table of Authorities**

*Cases:*

*KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1741 (2007) ..... pgs. 8 and 13

*Patents:*

U.S. Patent No. 6,246,994 to Wolveen, et al..... pg. 5 and 7-13

U.S. Patent No. 7,107,235 to Lyden ..... pg. 5 and 7-13

## **APPEAL BRIEF**

Commissioner for Patents  
U.S. Patent and Trademark Office  
Alexandria, Virginia

Sir:

Appellants submit this Brief in support of its appeal to the Board of Patent Appeals and Interferences from the decision of the Primary Examiner finally rejecting claims 10-14 in this patent application. For the reasons set forth in detail below, Appellants respectfully submit that the Primary Examiner's final rejection of these claims constitutes reversible error, and therefore, the Board should reverse the rejections of these claims.

*(i) Real Party In Interest (37 C.F.R. § 41.37(c)(1)(i))*

The real party in interest in this Appeal is NIKE, Inc., a corporation organized and existing under the laws of the State of Oregon in the United States of America having a principal place of business at One Bowerman Drive, Beaverton, Oregon 97005-6453. The Assignment of this application from the inventors to NIKE, Inc. was recorded in the U.S. Patent and Trademark Office records on March 14, 2002, at Reel 012723 and Frame 0228.

*(ii) Related Appeals and Interferences (37 C.F.R. § 41.37(c)(1)(ii))*

Appellants, the Assignee, and the undersigned legal representative of the Appellants and Assignee are unaware of any appeals or interferences related to the present Appeal.

*(iii) Status of Claims (37 C.F.R. § 41.37(c)(1)(iii))*

Claims 10-14 (reproduced for reference in the “Claims Appendix”) are pending in this application, with claim 10 being an independent claim. In a Final Office Action mailed December 6, 2007 (Evidence Appendix A), the Primary Examiner rejected each of claims 10-14. Claims 1-9 were withdrawn from further consideration during prosecution of this application and are not included as part of this Appeal.

Specifically, the Primary Examiner finally rejected claims 10-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,246,994 to Wolven, et al. (Evidence Appendix B; hereinafter “Wolven”) in view of U.S. Patent No. 7,107,235 to Lyden (Evidence Appendix C; hereinafter “Lyden”). Accordingly, Appellants appeal the final rejections of claims 10-14 under 35 U.S.C. § 103(a).

*(iv) Status of Amendments (37 C.F.R. § 41.37(c)(1)(iv))*

No amendments have been made to the claims following the Final Office Action dated December 6, 2007 (Evidence Appendix A).

*(v) Summary of Claimed Subject Matter (37 C.F.R. § 41.37(c)(1)(v))*

The present invention involves a shoe distribution center having various components. The following summary of the claimed subject matter identifies examples of portions of the original specification and drawings in which the various claim features are described or illustrated. The various claim features and the claimed subject matter may be described, discussed, and/or illustrated at other portions of the specification and/or in additional drawings not expressly identified in the summary that follows.

A summary of the claimed subject matter for the independent claim and the separately-argued dependent claim involved in this appeal follows:

**(a) Claim 10**

Appellants' claim 10 recites a shoe distribution center. *See* Originally-filed Specification, pg. 3, lns. 14 – pg. 4, ln. 2; pg. 5, lns.18-26; pg. 9, ln. 27 – pg. 10, ln. 1; Fig. 1 (101); and Fig. 4 (101); Evidence Appendix D. The shoe distribution center comprises: (1) an order receiving unit that receives orders from customers for footwear to custom fit the customer, each order identifying at least one last; *see* pg. 5, ln. 27 – pg. 6, ln. 22; Fig. 1 (113); and Fig. 4 (113); (2) a footwear inventory containing a plurality of pieces of footwear in a variety of sizes, such that an interior of each piece of footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear's original lengths and widths; *see* pg. 5, ln. 18 – pg. 6, ln. 13; pg. 6, ln. 23 – pg. 7, ln. 28; Fig. 1 (117); and Fig. 4 (117); and (3) a footwear manufacturing unit for remolding lengths and widths of pieces of footwear in the footwear inventory using lasts identified in orders received by the order receiving unit; *see* pg. 5, lns. 21-26; Fig. 1 (119); and Fig. 4 (119).

**(b) Claim 11**

Appellants' claim 11 recites the shoe distribution center recited in claim 10, wherein the footwear manufacturing unit includes: (1) a last inventory containing a plurality of lasts that can be used to remold lengths or widths or at least some pieces of footwear in the footwear inventory; *see* pg. 5, lns. 24-26; pg. 6, ln. 28 – pg. 9, ln. 11; Fig. 1 (121); and Fig. 4 (121); and (2) a heating unit for heating the lasts to remold lengths or widths of at least some of the pieces of footwear in the footwear inventory; *see* pg. 5, lns. 24-26; Fig. 1 (123); and Fig. 4 (123).

**(vi) *Grounds of Rejection to be Reviewed on Appeal (37 C.F.R. § 41.37(c)(1)(vi))***

In the Final Office Action mailed December 6, 2007 (Evidence Appendix A), the Primary Examiner finally rejected claims 10-14, the claims involved in this Appeal, based on the following ground of rejection:

- (a) Claims 10-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,246,994 to Wolven, et al. (*see* Evidence Appendix B) in view of U.S. Patent No. 7,107,235 to Lyden (*see* Evidence Appendix C). *See* the December 6, 2007, Final Office Action at pages 2-3 (Evidence Appendix A).

None of the pending claims have been allowed. Appellants appeal the final rejection of all of the pending claims in this application (*i.e.*, claims 10-14).

**(vii) *Argument (37 C.F.R. § 41.37(c)(1)(vii))***

For the reasons described in detail below, Appellants respectfully assert that the Primary Examiner's final rejection of claims 10-14 in this application constitutes reversible error. Accordingly, the Board should reverse the final rejection. Separate sections and arguments are provided below for independent claim 10 and for dependent claim 11.

**(a) Appellants' Claims 10 And 12-14 Patentably Distinguish from Wolven in View of Lyden**

The Primary Examiner rejected claims 10 and 12-14 under 35 U.S.C. § 103(a) as being unpatentable over Wolven (Evidence Appendix B) in view of Lyden (Evidence Appendix C).

See the December 6, 2007, Final Office Action at pages 2-3 (Evidence Appendix A). Appellants respectfully traverse this rejection, and courteously ask for its reversal.

To support a rejection of claims under 35 U.S.C. § 103(a), the Office must identify a reference or group of references that renders the claimed invention obvious to a person having ordinary skill in the pertinent art. *See* 35 U.S.C. § 103(a). Further, to support a rejection of a claim as *prima facie* obvious, the Office is required to present specific, articulated reasoning with some rational underpinning that supports the legal conclusion that claims are obvious. *See KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1741 (2007). Such reasoning may not be merely conclusory statements with no factual underpinning. *See id.; see also* 35 U.S.C. § 103(a).

In the present Appeal, Appellants' independent claim 10 recites a shoe distribution center, comprising: (1) an order receiving unit that receives orders from customers for footwear to custom fit the customer, each order identifying at least one last; (2) a footwear inventory containing a plurality of pieces of footwear in a variety of sizes, such that an interior of each piece of footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear's original lengths and widths; and (3) a footwear manufacturing unit for remolding lengths and widths of pieces of footwear in the footwear inventory using lasts identified in orders received by the order receiving unit. As described in Appellants' specification (Evidence Appendix D), the shoe distribution center comprises an order receiving unit that receives orders that each identifies at least one last. *See* Appellants' Originally-Filed Specification at *see* pg. 5, ln. 27 – pg. 6, ln. 22; Fig. 1 (113); and Fig. 4 (113); *see* Evidence Appendix D. Appellants respectfully submit that orders identifying at least one last is not taught or suggested by Wolven (Evidence Appendix B) in view of Lyden (Evidence Appendix C).

In pertinent part, Appellants' independent claim 10 recites, "an order receiving unit that receives orders from customers for footwear to custom fit the customer, each order identifying at least one last." (emphasis added). Nothing in Wolven (Evidence Appendix B) teaches or remotely suggests an order receiving unit that receives orders for custom footwear that includes identification of a last to be used in producing the footwear. Indeed, the Primary Examiner acknowledges that Wolven (Evidence Appendix B) does not disclose this feature. *See* Evidence Appendix A at pg. 2. Lyden (Evidence Appendix C) does not cure this deficiency.

As noted in Appellants' Request for Reconsideration filed September 11, 2007 (Evidence Appendix F), the Non-Final Office Action mailed March 12, 2007 (Evidence Appendix E) fails to address this claimed feature. Likewise, the Final Office Action mailed December 6, 2007 fails to address this claimed feature. *See* Evidence Appendix A. The Examiner has not identified the portion of the Wolven or Lyden reference that describes this claimed element.

Wolven describes a system in which information is received from a customer regarding an order. Wolven does not receive an order for footwear that identifies a last, as recited in Appellants' independent claim 10. Further, while the system of Lyden (Evidence Appendix C) may receive custom orders for footwear, Lyden does not describe an order submitted by a customer wherein the order itself identifies a last. Rather, the Lyden system itself selects a last *after* receiving the order information from the customer. Neither Wolven (Evidence Appendix B), Lyden (Evidence Appendix C), nor the combination thereof teaches all of the elements of the claimed invention recited in Appellants' independent claim 10 relating to receiving orders identifying a last. Because the Primary Examiner failed to address this recited element in any Office Action, he inherently failed to provide an articulated reason why this claimed feature

would have been obvious to a person having ordinary skill in the art based on the teachings described in the references.

Further, Appellants' independent claim 10 also recites, "a footwear inventory containing a plurality of pieces of footwear in a variety of sizes, such that an interior of each piece of footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear's original lengths and widths..." Wolven (Evidence Appendix B) in view of Lyden (Evidence Appendix C) do not describe these claimed features. The Examiner asserts that the Appellants' claimed "inventory" is found in Wolven (Evidence Appendix B) as the "information on the individual." *See* the March 12, 2007, Office Action at pg. 2; Evidence Appendix E. Appellants respectfully submit that this "information on the individual," as identified by Wolven (Evidence Appendix B), does not correspond to the "inventory" recited in Appellants' independent claim 10. Specifically, Appellants' independent claim 10 recites that the inventory constitutes a "plurality of pieces of footwear in a variety of sizes," *e.g.*, the items that are available for sale or distribution in response to the orders received via the order receiving unit. Moreover, the claimed "inventory" comprises the presently available inventory from which the shoe distribution center may choose in custom-manufacturing the article of footwear after receiving an order for a custom order. The shoe distribution center may consult its inventory, select the piece of footwear that most closely resembles the last that is needed to fulfill the custom order, and then it may proceed to mold that piece of footwear to meet the customer's exact specifications provided in the custom order. Nothing in Wolven's "information on the individual" constitutes any item available for sale or distribution in response to an order. *See* Evidence Appendix B.

Lyden (Evidence Appendix C) also does not describe a piece of footwear having a moldable fit-component that allows the piece of footwear to be remolded to lengths and widths differing from its original length and width, as recited in claim 10. Rather, Lyden (Evidence Appendix C) creates the custom piece of footwear from a last based on the specifications provided by the customer in the custom order. The footwear does not contain a moldable fit-component and is not remolded in any way. Therefore, neither Wolven (Evidence Appendix B) nor Lyden (Evidence Appendix C) describes the elements of “a footwear inventory containing a plurality of pieces of footwear in a variety of sizes, such that an interior of each piece of footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear’s original lengths and widths...” Further, the Examiner failed to articulate any reasoning that would support modifying the teachings of these references to arrive at the claimed invention.

Lastly, Appellants’ independent claim 10 recites a shoe distribution center that includes a footwear manufacturing unit. More specifically, Appellants’ independent claim 10 recites that the footwear manufacturing unit uses the last identified in the customer’s custom order (the last received by the receiving unit) to remold an article of footwear from the footwear inventory to the specifications of the last, *i.e.*, the lengths and widths. Notably, the Non-Final Office Action of March 12, 2007 (Evidence Appendix E) and the Final Office Action of December 6, 2007 (Evidence Appendix A) do not address this claimed feature. Thus, the Examiner has not articulated any reasoning or identified any portions of Wolven (Evidence Appendix B) or Lyden (Evidence Appendix C) that render this feature of the claimed invention *prima facie* obvious.

Based on the discussion above, it is clear that Wolven (Evidence Appendix B) in view of Lyden (Evidence Appendix C) do not teach elements of Appellants’ independent claim 10 or its

corresponding dependent claims 12-14. Appellants respectfully request that the Board reverse the Office's final rejection of these claims for at least these reasons.

**(b) Appellants' Claim 11 Patentably Distinguishes from the Combination of  
Wolven in View of Lyden**

The Primary Examiner rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Wolven (Evidence Appendix B) in view of Lyden (Evidence Appendix C). *See* the December 6, 2007, Final Office Action at pages 2-3 (Evidence Appendix A). Appellants respectfully traverse this rejection, and courteously ask for its reversal.

To support a rejection of claims under 35 U.S.C. § 103(a), the Office must identify a reference or group of references that renders the claimed invention obvious to a person having ordinary skill in the pertinent art. Further, to support a rejection of a claim as *prima facie* obvious, the Office is required to present specific, articulated reasoning with some rational underpinning that supports the legal conclusion that claims are obvious. *See KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1741 (2007). Such reasoning may not be merely conclusory statements with no factual underpinning. *See id.; see also* 35 U.S.C. § 103(a).

Appellants' claim 11 depends from independent claim 10 and thus the above arguments also apply to this claim. Additionally, Appellants' claim 11 further recites that the footwear manufacturing unit of the claimed shoe distribution center includes: (a) a last inventory containing a plurality of lasts that can be used to remold lengths or widths of at least some of the pieces of footwear in the footwear inventory; and (b) a heating unit for heating the lasts to remold lengths or widths of at least some of the pieces of footwear in the footwear inventory. Wolven (Evidence Appendix B) does not teach or suggest these claimed features. Lyden (Evidence Appendix C) does not teach a last inventory having a plurality of lasts that can be used

to remold lengths or widths or at least some of the pieces of footwear in a footwear inventory, wherein the footwear inventory includes moldable fit components. Nothing in Lyden (Evidence Appendix C) teaches or suggests using a last that is in a last inventory to fulfill a customer's order and remolding the shoe to fit the customer's specifications using the last. Notably, the Examiner does not address these claimed features in any Office Action. The Examiner simply concludes, with absolutely no articulated reasoning, that the claim features are obvious. Such conclusory obviousness rejections are clearly improper in light of *KSR Int'l v. Teleflex*, *supra*.

For these additional reasons, Appellants respectfully assert that Wolven (Evidence Appendix B) in view of Lyden (Evidence Appendix C) fail to render Appellants' dependent claim 11 *prima facie* obvious. Appellants respectfully request that the Board reverse the Office's final rejection of this claim for these additional reasons.

### ***Conclusion***

The December 6, 2007, Final Office Action (Evidence Appendix A) fails to carry the Office's burden of establishing that the claimed invention is rendered *prima facie* obvious by the cited patents. The cited patents simply fail to describe several features of the claimed shoe distribution center and the Primary Examiner has failed to provide any articulated reasoning that would support a finding of *prima facie* obviousness. Thus, the final rejections of claims 10-14 should be reversed. Appellants respectfully solicit reversal of these rejections.

In accordance with 37 C.F.R. § 41.31 Appellants submit this Appeal Brief to the Board of Patent Appeals and Interferences. Appellants submit the fee for filing an Appeal Brief in accordance with 37 C.F.R. § 41.20(b)(2) herewith. If, however, any additional fees are due to facilitate entry and consideration of this Appeal Brief and to maintain the pendency of this

application, the Commissioner is authorized to charge any necessary fees to the Deposit Account of the undersigned, Deposit Account No. 19-0733.

Respectfully submitted,

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Dated: December 19, 2008

**Claims Appendix (37 C.F.R. § 41.37(c)(1)(viii))**

**Claims Involved in the Appeal**

**Claims Appendix (37 C.F.R. § 41.37(e)(1)(viii))**  
**Claims Involved in the Appeal**

This Appendix includes a clean copy of claims, the claims involved in this Appeal:

10. A shoe distribution center, comprising:

an order receiving unit that receives orders from customers for footwear to custom fit the customer, each order identifying at least one last;

a footwear inventory containing a plurality of pieces of footwear in a variety of sizes, such that an interior of each piece of footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear's original lengths and widths; and

a footwear manufacturing unit for remolding lengths and widths of pieces of footwear in the footwear inventory using lasts identified in orders received by the order receiving unit.

11. The shoe distribution center recited in claim 10, wherein the footwear manufacturing unit includes:

a last inventory containing a plurality of lasts that can be used to remodel lengths or widths or at least some of the pieces footwear in the footwear inventory;

a heating unit for heating the lasts to remodel lengths or widths of at least some of the pieces of footwear in the footwear inventory.

12. The shoe distribution center recited in claim 10, wherein the order-receiving unit includes a server computer for receiving orders for custom fitting footwear over an electronic communication network.

13. The shoe distribution center recited in claim 10, wherein the order-receiving unit includes an automated voice menu system for receiving orders for custom fitting footwear over a telephone service.

14. The shoe distribution center recited in claim 10, further comprising:  
a customer/last database containing one or more customer records, such that each record includes a customer field identifying and at least one last field identifying a last associated with the customer.

**Evidence Appendix A (37 C.F.R. § 41.37(c)(1)(ix))**

**December 6, 2007 Final Office Action**

This Final Office Action was issued by Examiner Andrew Rudy on December 6, 2007.



## UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/099,685	03/14/2002	Daniel R. Potter	005127.00033	4915
22909	7590	12/06/2007		
BANNER & WITCOFF, LTD. 1100 13th STREET, N.W. SUITE 1200 WASHINGTON, DC 20005-4051			EXAMINER RUDY, ANDREW J	
			ART UNIT 3627	PAPER NUMBER
			MAIL DATE 12/06/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/099,685	POTTER ET AL.	
	Examiner Andrew Joseph Rudy	Art Unit 3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 11 September 2007.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 10-14 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    - 1) Certified copies of the priority documents have been received.
    - 2) Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3) Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_.
- 4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

**DETAILED ACTION**

1. Applicant's September 11, 2007 Amendment has been reviewed. Claims 1-9 remain withdrawn from consideration as drawn to a non-elected invention.

***Claim Rejections - 35 USC § 103***

2. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolven et al. US 6,246,994 and further in view of Lyden, US 7,107,235.

Wolven discloses a distribution center, e.g. Figs. 1-4B, comprising at least one identified article, and an order receiving unit, e.g. 20, and inventory, e.g. information on the individual. Wolven does not disclose a shoe last.

Official Notice is taken that shoe distribution centers associated with customer last orders for footwear has been common knowledge in the shoe distribution art.

Lyden discloses such, e.g. Figs. 252, 323, 349 and related text.

To have provided shoe distribution centers associated with customer last orders for footwear with the custom ordering system of Wolven would have been obvious to one of ordinary skill in the art in view of Official Notice, e.g. Lyden. The motivation for having done such would have been to facilitate well known shoe sale commerce to increase sales.

Applicant's September 11, 2007 REMARKS have been reviewed, but are not convincing. Regarding custom footwear associated with shoe lasts and distribution centers, Lyden discloses such.

Regarding the statement "wherein each order identifies at least one last" no such particular language is present from claim 10. Custom footwear associated with a particular shoe last has been notoriously common knowledge in the shoe last art. To have provided such with Wolven as modified by Official Notice, e.g. Lyden, would have been obvious to one of ordinary skill in the art.

To use the inventory of Wolven to have included a plurality of pieces of footwear in a variety of sizes and the manufacturing units associated therewith, would have been obvious in view of Official Notice, e.g. Lyden. Using a shoe last to remolded to various lengths and widths would have been an obvious variant when viewing Wolven, in view of Official Notice, e.g. Lyden.

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 571-272-6789. The examiner can normally be reached on Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ryan M. Zeender can be reached on 571-272-6790. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Andrew Joseph Rudy  
Primary Examiner  
Art Unit 3627

<b>Notice of References Cited</b>		Application/Control No.	Applicant(s)/Patent Under Reexamination 10/099,685 POTTER ET AL.	
		Examiner Andrew Joseph Rudy	Art Unit 3627	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-7,107,235	09-2006	Lyden, Robert M.	705/26
B	US-			
C	US-			
D	US-			
E	US-			
F	US-			
G	US-			
H	US-			
I	US-			
J	US-			
K	US-			
L	US-			
M	US-			

**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
N					
O					
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**NON-PATENT DOCUMENTS**

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)	
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\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(e).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



**Index of Claims****Application/Control No.**

10/099,685

**Examiner**

Andrew Joseph Rudy

**Applicant(s)/Patent under Reexamination**

POTTER ET AL.

**Art Unit**

3627

<input checked="" type="checkbox"/>	<b>Rejected</b>
=	<b>Allowed</b>

<input type="checkbox"/>	<b>(Through numeral) Cancelled</b>
+	<b>Restricted</b>

<input type="checkbox"/>	<b>N Non-Elected</b>
I	<b>Interference</b>

<input type="checkbox"/>	<b>Appeal</b>
O	<b>Objected</b>

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**Evidence Appendix B (37 C.F.R. § 41.37(c)(1)(ix))**

**U.S. Patent No. 6,246,994 to Wolven, et al.**

This patent was originally made of record and relied upon by the Office in the Non-final Office Action mailed March 12, 2007.



US005246994B1

(12) **United States Patent**  
**Wolven et al.**

(10) **Patent No.:** US 6,246,994 B1  
(45) **Date of Patent:** Jun. 12, 2001

(54) **SYSTEM AND METHOD FOR PROVIDING  
STANDARDIZED INDIVIDUAL  
INFORMATION**

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(73) Assignee: TheRightSize, Inc., Burlingame, CA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(22) Filed: Feb. 19, 1999

(51) Int. Cl.<sup>7</sup> ..... G06F 17/60

(52) U.S. Cl. ..... 705/14; 702/1; 702/2;  
702/3; 709/203; 709/217

(58) Field of Search ..... 705/3, 26, 2, 1,  
705/4; 702/1; 709/203, 217; 707/10, 104;  
700/132

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Primary Examiner—James P. Trammell

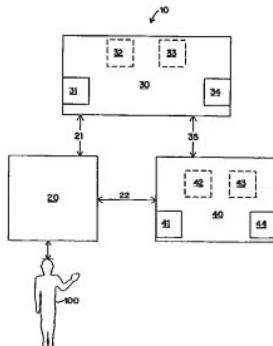
Assistant Examiner—Mussie Tesfamariam

(74) Attorney, Agent, or Firm—Fenwick & West LLP

ABSTRACT

A system and a process to facilitate transactions between individuals and providers of goods and/or services. The system includes a master database unit for retaining information related to various characteristics of interest of a plurality of individuals. Each set of information associated with a particular individual is provided with a unique personal code that is supplied to the individual. In any remote communications with the goods/services provider, the individual supplies the personal code. The provider in turn contacts the master database unit and supplies an access code and a particular one or more of the personal codes. The master database unit returns to the provider the set or sets of information associated with the personal code or codes. Based on that information the provider can ensure compatibility of the goods or services with the individual's interests and characteristics. The system of the invention reduces the interface time between the individual and the provider. It also ensures the relevant information can be supplied more quickly and with greater accuracy.

54 Claims, 6 Drawing Sheets



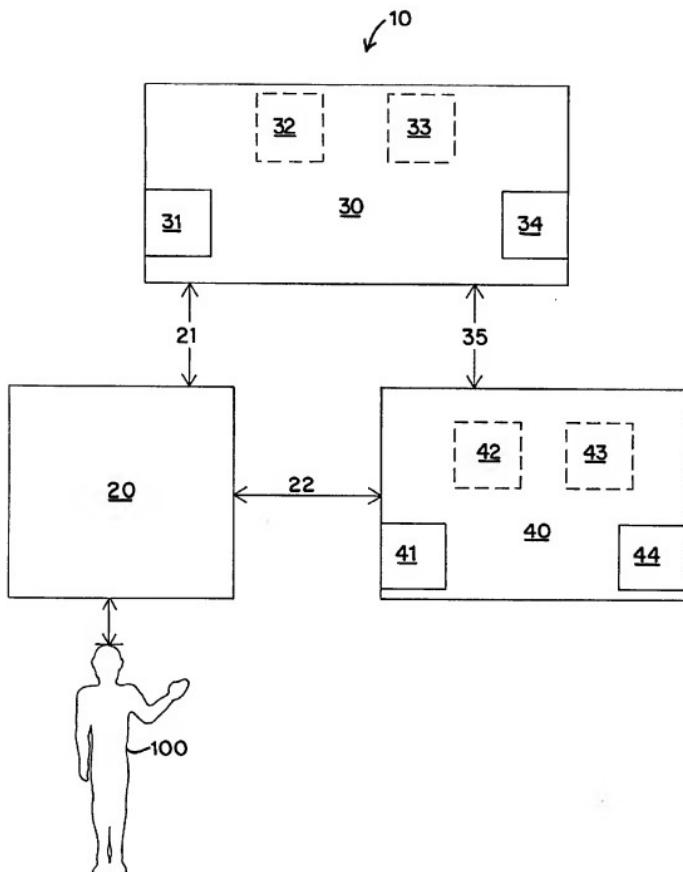


FIG 1

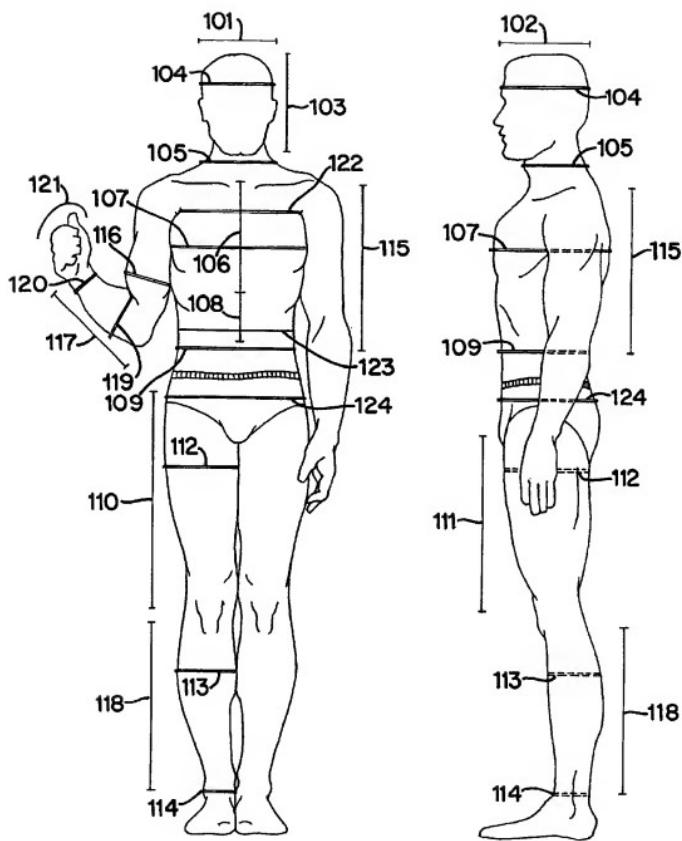


FIG 2

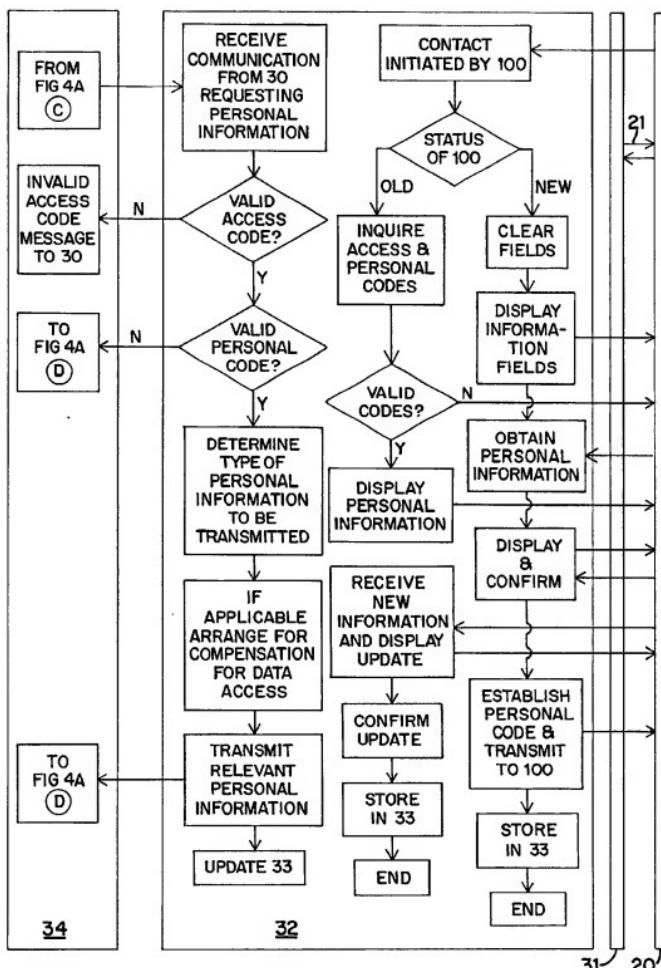
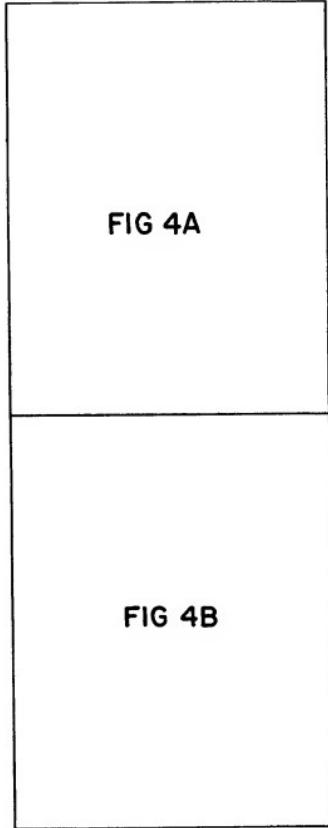


FIG 3



**FIG 4A**

**FIG 4B**

**FIG 4**

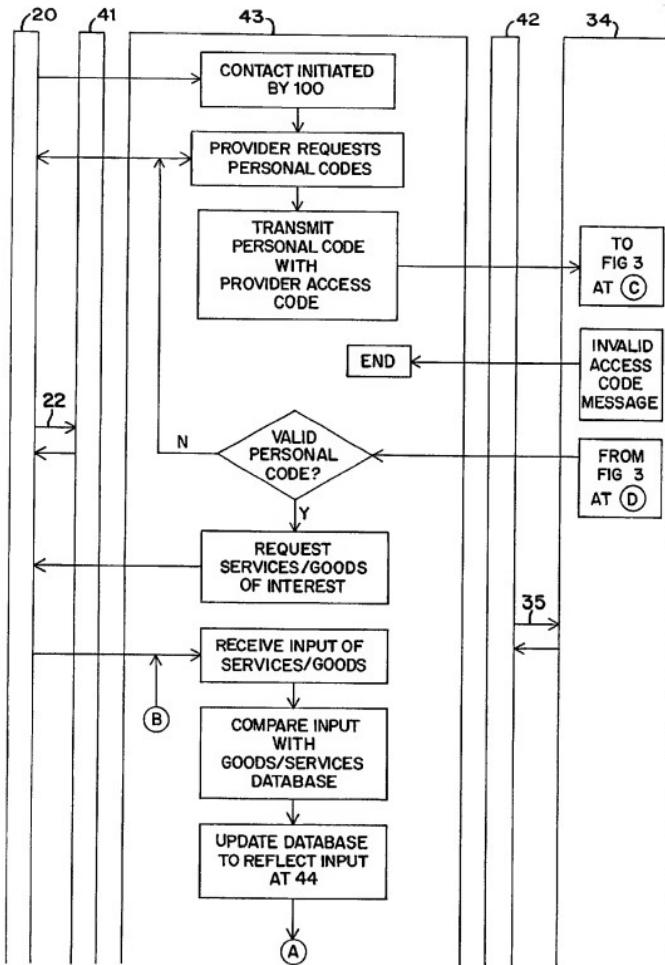


FIG 4A

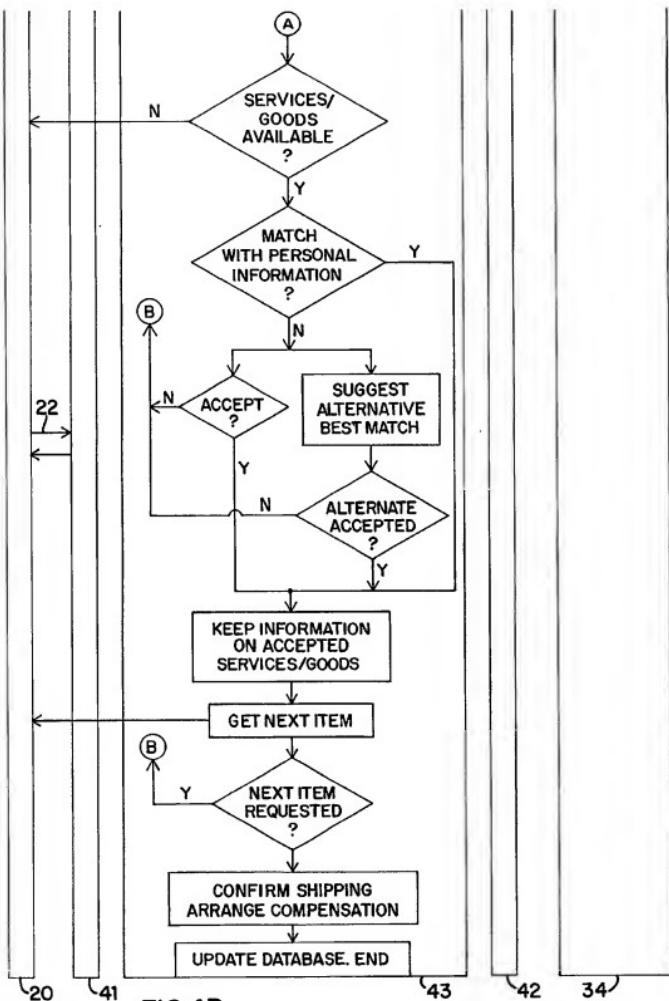


FIG 4B

**SYSTEM AND METHOD FOR PROVIDING  
STANDARDIZED INDIVIDUAL  
INFORMATION**

**BACKGROUND OF THE INVENTION**

1. Field of the Invention

The present invention relates to systems for organizing information related to the characteristics of individuals. More particularly, the present invention relates to systems and methods for gathering such information for centralized storage and access from remote locations. The present invention is a system that enables remote subscribers to access individual's information in order to provide compatible goods and services.

2. Description of the Prior Art

Database systems have been developed for many years as relatively convenient means to store information of interest in a centralized and accessible location. That location may be one or more filing cabinets, for example, when the storage means is paper. With the introduction and development of computing systems, and personal computing systems in particular, the storage location can easily be a computer and the storage means is any sort of compatible storage device. These devices include, but are not limited to, data storage media such as computer hard drive, random-access and read-only memories, floppy disks, and CD-ROM to name only the well-known computer-based storage media. Their usefulness in retaining vast amounts of information in a relatively small physical presence is apparent. The ever increasing speed and capacity associated with the continuing evolution of computing systems makes access to this vast quantity of information easier and more desirable.

The types of information that can be stored in a database are almost limitless. For purposes of the present invention to be described herein, information associated with the characteristics of individuals is one such type. That is, information regarding the educational background, employment background, medical history, for example, of one or more persons can be, and is, retained in a computer-based database. In addition, the physical characteristics, such as physical dimensions, of individuals can be gathered and stored in a database. Among other things, this type of information would be of particular value to suppliers of clothing, footwear, and the like.

Increasingly, more individuals are purchasing clothing (including footwear, headwear, and other peripherals) remotely rather than in point-of-sale transactions. Such sales are made via in-home purchases through telephone or written requests based on observed catalog information, or via computer-based interfacing, such as through the Internet. One aspect of clothing purchasing lost in these remote transactions is the fit of the purchased item. In point-of-sale transactions of the type that occur at the retailer located at the nearby mall, the consumer can touch items of interest, get a strong sense of their appearance and, importantly, they can try them on to confirm fit prior to completing the purchase. On the other hand, remote sales do not permit such direct contact and confirmation of the compatibility of the product with the individual's unique characteristics. They do, however, provide considerable convenience to the consumer who can usually make purchases at any time, and in much less time, than expended in a point-of-sale transaction. The corresponding reduction in the expense associated with facilities upkeep and staffing make remote sales desirable for goods and services suppliers.

Although statistics vary from one supplier to the next, it is well known that returns of remotely purchased clothing

items constitute a significant portion of the transactions that occur. In some instances, it has been noted that perhaps as much as 50% of the retail catalog and Internet clothing sales are returned. One of the more common reasons for such returns is an incompatible fit of the clothing with the individual's physical characteristics. It is particularly difficult for the consumer in that regard because one supplier's size large may be the dimensional equivalent of another's small. Some suppliers attempt to alleviate this problem by offering charts relating a few physical dimensions (shoe size, waist size, inseam, for example) to that supplier's clothing sizes. Unfortunately, such relational charts are generally insufficient to ensure an accurate fit. The result is aggravation for the consumer who may be less inclined to continue making remote purchases and increased costs for the supplier as a result of the need to process, and absorb the expense of, the return.

Some attempts have been made to provide means enabling consumers to purchase from a remote site clothing that will likely be of a suitable size. U.S. Pat. No. 5,515,268 issued to Yoda describes a system that permits a consumer to access a remotely located computer containing information regarding available products, clothing in particular. The Yoda system comprises a processor including a shape sensor 25 that scans the individual consumer. The consumer's scanned image is processed and compared with clothing of the type desired by the consumer. The computer provides to the consumer an output indicating what size clothing will fit and whether the selected clothing is available to order. Assuming the clothing of interest is available in a suitable size, the consumer can then place an order. Unfortunately, the Yoda system requires the consumer to proceed to a location where the scanning unit exists. Moreover, each supplier would have to make available its own scanning and processing system in order to enable the system. This would be a costly and expensive undertaking, and would require continual maintenance to ensure appropriate scanner calibration.

In another clothing ordering system previously disclosed, U.S. Pat. No. 4,149,246 issued to Goldman describes a system for remote interfacing between a consumer and a supplier. The Goldman system allows a consumer to input into a computing system physical dimension data and transmits that data to the supplier. The supplier in turn creates a custom-fabricated piece of clothing based on that data. This system is preferable over the Yoda system in that the consumer can effect an order from a remote location of choice. However, Goldman is not suitable for the relatively large volume supplier in that it requires custom fabrication. In some instances that may be suitable, but it is terribly cost inefficient and renders the process impractical and uneconomical for most consumers as well as most suppliers, particularly those offering products by catalog.

Therefore, what is needed is a system and a method to enable consumers to obtain products and services, including clothing, remotely from a place of choice, such as the home. What is also needed is a system and a method that enables remotely positioned suppliers to provide products and services that accurately conform to the characteristics of the purchaser. Further, what is needed is such a system that is relatively easy to establish and maintain using existing computing devices and programming techniques. Yet further, what is needed is such a system that requires minimal peripheral equipment to satisfy the consumer's needs and the supplier's capabilities. Such a system may further be developed more generally to provide synchronized readily accessible data regarding most any sort of individualized information.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a system and a method to enable consumers to obtain products and services, including clothing, remotely from a location of choice. It is also an object of the present invention to provide a system and a method that enables remotely positioned suppliers to provide products and services that accurately conform to the characteristics of the purchaser. A further object of the present invention is to provide such a system that is relatively easy to establish and maintain using existing computing devices and programming techniques, and that requires minimal peripheral equipment to satisfy the consumer's needs and the supplier's capabilities. The present invention is further provided as a system to provide synchronized readily accessible data regarding most any sort of individualized information.

These and other objectives are achieved in the present invention through the formation of a database of information related to the characteristics, e.g., physical, medical, and any others of interest, of a plurality of individuals. The database is developed either by gathering information of interest directly from such individuals or by accessing existing databases of such information. A key aspect of the invention is the creation for each individual of a personal code that enables access within the database to the subset of information associated with that individual. Using appropriate security measures, database subscribers, such as retail clothing providers for example, are permitted to gain access to the individual's information when contacted by the individual (or another with permitted access to the personal code, such as a gift giver) to provide goods or services. The system further includes for each subscriber means, such as a computer program, to compare the individual's accessed information with the characteristics, including availability, of the products and/or services provided by the subscriber.

The system of the present invention is an effective three-way interface between the individual, the provider of goods and/or services, and the database manager. The individual can, from a location of choice, contact the provider directly regarding that which the provider offers. The individual gives the provider the personal code and information regarding goods or services of interest, which information has been developed by the provider. At or about the same time, the provider independently contacts the database manager and presents the necessary provider security access code as well as the individual's personal code. The database manager returns to the provider requisite information relevant to the completion of the transaction initiated by the individual. The provider compares that individualized information with its own information regarding availability of products and/or services compatible with that individual's characteristics and stated products/services interests. This three-way interaction may all occur while the individual and provider remain in communication, such as through a telephone link.

The advantages provided by the system and method of the present invention are apparent. First, the individual can, from a location of choice, interface with the goods/services provider in a manner substantially the same as has become prevalent. There is no requirement to proceed to a point-of-sale retail site. In regard to clothing purchases for example, and those prior-art sizing and custom fabricating systems previously described in particular, there is no requirement to travel to a specific location for body scanning. However, it is to be noted that the present invention does provide significant advantages over the prior art in point-of-sale transactions as well. Specifically, a customer may enter a

goods/services provider with a conventional swipe card, or the like, and use that device to initiate the process of retrieving the stored personal information of interest in regard to that particular provider.

For the goods/services provider there are significant advantages associated with the system of the present invention. The time associated with the interaction between the company employee and the customer may be reduced significantly as all relevant information can be obtained immediately upon receipt of the personal code. More importantly, 10 correct use by the provider of the information obtained will ensure that a particular product or service, if available, will conform to the customer's characteristics. Returns would thereby be significantly reduced. In the long term, goods and services providers will be able to focus their inventory to those items in those sizes (again in the example of clothing) most commonly sought. Finally, gift givers would be able to purchase suitable products and/or services for particular individuals with certainty of choice as well as sizing, without the individual being aware of the transaction. This is of 15 particular value, for example, to spouses purchasing gifts for a variety of special occasions.

Of course, it can be seen that the basic advantages of the present invention may be extended well beyond the area of remote clothing sales. For example, an individual's medical characteristics may be stored in the master database and accessed through the personal code. The local and mail order pharmacists, the physician, the emergency medical technician, and the hospital would immediately be able to identify all relevant medical information associated with that individual. The impact on the speed and certainty of the care provided would be significant. There would be an important reduction in errant prescriptions. Medical service providers would have immediate medical history and thereby be able to develop a suitable course of treatment in a fraction of the time now involved in either waiting to discover that information or conducting trial-and-error treatment steps.

The system of the present invention provides for each individual complete physical size information including, but not limited to, physical vagaries (such as a physical deformity, lost limbs, etc.), materials and colors of interest, 20 allergies to materials, mailing, shipping, billing, and communications addresses—all information of interest to a clothing supplier. For the medical services provider, the system of the present invention includes, but is not limited to, for each individual similar types of information that may be applicable to care for the individual in life and in death (such as the necessary size of a coffin, personal preferences as to body disposal, to name two), full medical characteristics and donor status, and home and emergency contacts and the like. The database is further designed to accommodate information that may be available in the future such as, for example, DNA mapping of an individual should that technology be developed.

In the area of transportation, hotel/motel, entertainment providers, and the like, such a provider can access the system of the present invention in order to obtain physical sizing for seating requirements, preferences as to style, level, class of travel or accommodation, food allergies, dietary requirements, and personal and emergency contact information. In summary, the combination of the master database and personal code of the present invention provide many advantages in the accuracy of essentially any goods/services transactions.

It is to be understood that other objects and advantages of the present invention will be made apparent by the following description of the drawings according to the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a simplified schematic diagram of the system interface of the present invention.

FIG. 2 is a simplified front view of an individual showing measurement sites for providing individualized information with regard to clothing sizes for example.

FIG. 3 is a flow chart of processing steps associated with the interface between the master database manager and a goods or services provider, and the interface between the master database manager and the individual providing information and receiving a personal code.

FIG. 4, including FIGS. 4A and 4B, is a flow chart of the processing steps associated with the interface between the goods or services provider and the master database manager, and the interface between the goods or services provider and the individual requesting goods or services.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An information accessing and transaction assisting system 10 of the present invention is shown in simplified form in FIG. 1. The system 10 includes an individual interface unit 20, a master database unit 30, and a goods/services provider unit 40. Each of units 20, 30, and 40, is coupled together in a manner such that information may be shared between all three associated entities of an individual 100, a database manager, and a goods/services provider. The interfacing between those entities provided by the system 10 is designed to enable the provider to supply to the individual 100 goods and/or services compatible with the individual's relevant characteristics.

The interface unit 20 may take to form of any type of device capable of delivering information between the individual 100 and either the database manager or the provider. Obvious forms of the interface unit include, but are not limited to, computer means such as personal computers, network-linked computing units, personal digital assistants and the like, satellite and/or cable based audio telephones, televisions, facsimile machines, magnetic devices such as swipe cards, as well as express and standard mail. Through the unit 20, the individual 100 first provides to the database unit 30 information regarding various specific characteristics of the individual 100. This information may include clothing and footwear dimensions, tastes in clothing or any sort of individual goods/services preferences. The information may also include characteristics of the individual 100 that are not directly tied to items that the individual may wish to obtain, but are nevertheless unique to the individual 100, such as medical history of allergies, past surgical procedures, to name just two.

The information is transferred from the individual unit 20 to the database unit 30 via an information link 21 of any suitable type including, but not limited to, wireless, hard-wired, magnetic transceivers, optical readers, or conventional forms of mail. Initially, the database manager through an information transceiver 31 of the unit 30 may obtain the information from the individual 100 directly or indirectly. The transceiver 31 may be a standard RS-232 communications port, a radio message transceiver, or simply an employee who takes audio or textual information obtained from the individual 100 and inputs it into the unit 30. The database unit 30 further includes a storage component identified in the simplified illustration as item 32 within which the information obtained from the individual 100 is retained. The storage component 32 may be any suitable

form of mass storage device including, but not limited to, a mass storage area of a computing unit, such as a mainframe or personal computer, CD-ROM, or a floppy disk. The storage unit 32 is coupled to a processor 33 that controls the flow of the information into and out of the unit 30. The storage unit 32 is preferably designed to retain a considerable volume of data as the number of individuals providing information increases.

Upon confirmation that the information provided is suitably complete, based on parameters developed by the database manager, the processor 33 provides through interface 31 to the individual 100 a personal code that is unique to that individual. The personal code may take any suitably transferable form, such as a digitally based series of alphanumeric inputs. Of course, the personal code may take some other form, such as a fingerprint, an eye print, a voice print or any other unique identifier system that has been or that may be developed. The personal code obtained from the database manager can then be used by the individual 100 to communicate requisite information to the provider. Specifically, the individual 100 may communicate with the provider at provider unit 40 through the individual unit 20. A provider link 22 that may be the same as the information link 21 or similar thereto, enables communication between the individual 100 and the provider. The provider link 22 may be a wireless coupling, a hard-wired coupling, a magnetic device for receiving magnetic swipe cards, any conventional form of mail, or even an in-person contact, linked to a provider transceiver 41 that may be substantially the same as transceiver 31.

The final interface of the system 10 of the present invention involves the link between the database unit 30 and the provider unit 40. A provider interface transceiver 34 of the database unit 30 is coupled to a database transceiver 42 of the provider unit 40 via database link 35. Transceiver 34 and transceiver 42 may each be any suitable type of transceiver such as that described with reference to transceiver 31. Further, the database link 35 may be any form of high-speed interface, such as a wireless coupling, a hard-wired coupling, a magnetic device for receiving magnetic swipe cards. In some circumstances it may be a slower communications device, such as any conventional form of mail, or even an in-person contact. It is through database link 35 that the provider unit 40 transmits a unique access code of suitable configuration, such as a digitally based alphanumeric sequence for example, to the database unit 30 through transceiver 34. The access code is accompanied by the individual's personal code supplied by the individual 100 to the provider. The database link 35 also enables exchange from the database unit 30 to the provider unit 40 of the relevant 30 information of the individual 100 sought by the provider. The provider unit 40 preferably includes a processor 43 and a local storage device 44 for retaining and processing the relevant information such that the individual 100 may be supplied with price, availability, and other relevant information regarding compatible goods and/or services sought.

After the individual 100 has supplied relevant characteristic information to the master database unit 30 and has received a personal code, the process associated with the interfaces described with respect to FIG. 1 includes the following steps. First, the individual 100 contacts the provider via unit 20 and unit 40 in order to place an order for goods or services, or for other forms of assistance. Preferably, the provider's first step is to obtain the individual's personal code. That personal code and the provider's access code are then relayed from the provider unit 40 to the

database unit 30 while the individual 100 continues to describe the particular goods and/or services sought from the provider. During the development of that transaction, the processor 33 of the database unit 30 confirms the access and personal codes, retrieves the characteristic information of the individual 100 from the storage unit 32 and relays it back to the provider unit 40. The provider processor 43 compares the individual's characteristics with the goods/services sought by the individual 100 and available to the provider through inventory software or other means. The transceiver 41 then supplies to the individual 100 through unit 20 information regarding pricing, availability, and the like necessary for completion of the transaction. The individual 100 may then make a final decision whether to complete the transaction with much greater certainty as to compatibility than has been available in prior remote transactions. The provider can optionally store information associated with the transaction in local storage unit 44.

An example form of individual information suitable for delivery by the individual 100 to the master database unit 30 is shown in FIG. 2 with respect to a remote clothing purchase based on material presented in a mail-order catalog. Generally, consumers provide, at most, the following information regarding clothing sizes: 1) an indication of whether a small, medium, large, etc. is desired; 2) waist and inseam values for pants; 3) specific dress sizes presumed to be consistent from one provider to another; and 4) shoe size. Under even the most ideal present conditions, a consumer may supply the following information to the provider: neck, arm length, chest, waist, hip, and inseam dimensions, and shoe size. Gathering this information alone can be time consuming for the consumer as well as the provider. That form of relatively detailed communication, particularly when conducted verbally, can also lead to inaccuracies in the exchange. Therefore, in order to maximize the assurance of a compatible fit between the dimensions of the individual 100 and the clothing offered by the provider, the database unit 20 may be supplied with detailed dimensional information. As shown in FIG. 2, for example, the following 24 minimum measurement sites are suggested in order to improve fit certainty. A first location is the width of the head from ear-to-ear at 101. The second location is the width of the head from the nose to the back of the head at 102. The third location is the height of the head at 103. The fourth site is the circumference of the head at forehead level at 104. The fifth location is the neck circumference at 105. The sixth suggested measurement site is the distance from the collarbone to the solar plexus at 106. The seventh location is the chest circumference at 107. The eighth site is the distance from the solar plexus to the bend of the waist at 108. The ninth location is the waist circumference at 109. The tenth site is at the distance from the hip joint to the pivot of the knee at 110. The eleventh measurement location is the distance from the shoulder to the pivot at the elbow shown at 115. The sixteenth location is the circumference of the flexed biceps at 116. The seventeenth location is the distance from the pivot of the elbow to the pivot of the wrist at 117. The eighteenth site is the length of the calf at 118. The nineteenth site is the circumference of the forearm at 119. The twentieth location is the circumference of the wrist at 120. The twenty-first location is a tracing of the hands at 121. The twenty-second site is the width of the chest at 122. The

twenty-third site is the width of the waist at 123. The final preferred measurement location is the width of the hips at 124. Of course, these locations may be modified, or the number preferably increased, in order to enhance the effectiveness of the system 10.

In order to enable the operation of the present invention, certain minimum process steps are required with reference to FIGS. 3 and 4. FIG. 3 provides a summary description of the preferred communications arrangement between the master database unit 30 and the individual unit 20 and the database unit 30 and the provider unit 40. Initially in establishing or revising the database, the database unit 30 receives from the individual 100 a contact designed to effect the creation of a personal code to be supplied to the provider unit 40 when a transaction is desired. The initial contact may be made directly by the individual 100 or through some suitable intermediary, such as a credit-card service for example. Either way, the status of the individual 100 is determined as being an existing database participant or a new one. If an existing participant, the individual 100 is prompted to supply an access code that may simply be the personal code. Once the code is validated, the processor 32 presents to the individual 100 his/her personal information. The individual 100 can then act to modify that information as desired, with the processor updating the storage device 33 and confirming with the individual 100 the accuracy of the information.

If the individual's status is that of a new participant, the processor 32 clears all relevant fields and presents them, preferably as a series of selectable choices, for the individual 100 to consider. The individual 100 enters personal data, such as sizing, medical information, addresses, etc., which are recorded with the storage device 33. The entered information is presented to the individual 100 for review and confirmation. Any changes are made and re-entered into the device 33. A personal code is then generated by the processor 32 and provided to the individual 100 for future use.

With reference to FIGS. 4A and 4B in combination with FIG. 3, the individual 100 having a personal code initiates contact with a goods/services provider by way of provider unit 40. The provider processor 43 obtains the individual's personal code and transmits that information as well as its own access code to the database processor 32 for validation. If the access code is denied, the link between the database unit 30 and the provider unit 40 is preferably terminated or the provider is otherwise advised that such problem exists, with resolution of the problem an option. If access is denied, the provider must communicate with the individual 100 regarding personal information via the slower conventional methods previously described. If access to the database is permitted, the processor 32 for validity reviews the personal code for the individual 100. If denied, the database unit 30 notifies the provider unit 40 for confirmation, revision, or the like. If the personal code is validated, only personal information of interest to that particular type of provider for the individual 100 is transmitted to the provider processor 43. The system 10 preferably includes means to require the provider to arrange for compensation to the entity responsible for development and/or maintenance of the master database. Of course, if the provider were an emergency service provider for example, access to the relevant personal information, at least in the case of an emergency situation, would likely not be contingent upon arrangement for compensation. Instead, access would likely be provided automatically.

With continuing reference to FIGS. 4A and 4B, the remainder of the interfacing will occur between the indi-

vidual 100 and the provider unit 40. Specifically, the provider unit 40 obtains from the individual 100 a first request for a service or an item. That service/goods input from the individual 100 is compared to the database of provider's available services/goods as well as the personal information for that individual as received from the database unit 30 for a match. In addition, a compilation of consumer requests can be developed by directing the input information into the storage unit 44. If a match is confirmed, the transaction information may be retained and the individual 100 advised of the match. If the comparison yields no match, the individual 100 is advised and asked whether to accept that which is available, accept the next best match to that requested, to proceed to another services/goods request, or to terminate the transaction. If an alternative is accepted, that information is retained. The individual 100 is then prompted to request the next services or goods of interest and the cycle described repeated. Of course, since the provider unit 40 has the personal information from the database unit 30, the cycle time is substantially less than that of existing transactional processes.

The balance of the processing steps is straightforward. When the individual 100 instructs the provider that no other goods or services are to be requested, the transactional information is confirmed, billing and shipping information 25 confirmed, and the process terminated. The provider may then update its internal database storage unit 44 to assist in tailoring its inventory, service procedures, and the like, to the most common requests made. It can be seen that those with reasonable skill in the development of computer programs will be able to create a working system of the present invention based upon a review of this detailed description and consideration of FIGS. 3 and 4.

It should be understood that the preferred embodiment of the present invention as described herein is merely illustrative. Numerous variations and equivalents in design and use of the present invention may be contemplated in view of the following claims without straying from the intended scope and field of the invention disclosed.

#### We claim:

1. A system for assisting in activities related to purchasing an offering, wherein an offering may be either a good or a service, or both, the system comprising:

a first computer adapted to receive characteristic information provided by an individual, and to transmit the characteristic information upon request of the individual over a network to a remote master database; the master database, coupled to the network and remote from the first computer, and adapted to receive and store the characteristic information for the individual, adapted to generate a unique personal code for the individual, and to transmit the personal code to the first computer; the master database further storing for each of a plurality of different providers, including a first provider, a database access code associated with each provider; and

a provider computer of the first provider, at a location remote from the first computer and the master database, and coupled to the master database and the first computer via the network, the provider computer adapted to receive from the first computer a request for a type of offering to be provided to the individual and the unique personal code for the individual, and adapted to transmit the database access code of the first provider and the unique personal code of the individual to the master database, upon authentication of the database access

code and the unique personal code by the master database, the master database transmits the characteristic information of the individual relevant to the type of offering to the provider computer, the provider computer selects a particular offering of the requested type and corresponding to the characteristics of the individual and transmits information about the selected offering to the first computer.

2. The system of claim 1 wherein the first computer is adapted to receiving the unique personal code for the individual from a gift giver and transmitting a request from the gift giver for the type of offering to be provided to the individual and the unique personal code for the individual to the provider computer.

3. The system of claim 1 further comprising:

a second computer adapted to receiving the unique personal code for the individual provided by a gift giver, the second computer at a location remote from the first computer, the provider computer and the master database, and coupled to the master database, the provider computer and the first computer via the network;

the provider computer of the first provider adapted to receive from the second computer a request for a type of offering to be provided to the individual and the unique personal code for the individual, and adapted to transmit the database access code of the first provider and the unique personal code of the individual to the master database, upon authentication of the database access code and the unique personal code by the master database, the master database transmits the characteristic information of the individual relevant to the type of offering to the provider computer, the provider computer selects a particular offering of the requested type and corresponding to the characteristics of the individual and transmits information about the selected offering to the second computer.

4. The system of claim 1 wherein the characteristic information comprises size-related information.

5. The system of claim 1 wherein the characteristic information comprises clothing taste preferences.

6. The system of claim 1 wherein the characteristic information comprises footwear taste preferences.

7. The system of claim 1 wherein the characteristic information comprises clothing sizing information.

8. The system of claim 1 wherein the characteristic information comprises footwear sizing information.

9. A method for assisting in activities related to purchasing an offering, wherein an offering may be either a good or a service, or both, the method comprising:

storing at a master database a plurality of database access codes, each database access code associated with a different provider;

receiving at the master database characteristic information for each of a plurality of individuals over a network from computers, including a first computer, at locations remote from the master database;

generating in the master database a unique personal code for each individual in response to receiving the individual's characteristic information;

transmitting from the master database the unique personal code to each individual's computer;

receiving a request for a type of offering to be provided to one of the individuals and the personal code associated with the individual from the first computer over the network at a provider computer of a first provider that

is remotely situated with respect to the first computer and the master database, and coupled to the master database and the first computer via the network; receiving at the master database a database access code of the provider and the personal code of the individual from the provider computer; authenticating in the master database the database access code and the unique personal code; upon authentication, transmitting from the master database the characteristic information of the individual associated with the personal code and relevant to the type of offering to the provider computer; selecting by the provider computer a particular offering of the requested type and corresponding to the characteristics of the individual; and transmitting from the provider computer information about the selected offering from the provider computer to the first computer.

10. The method of claim 9 further comprises receiving the unique personal code for the individual from a gift giver by a first computer and transmitting a request from the gift giver for the type of offering to be provided to the individual and the unique personal code for the individual from the first computer to the provider computer.

11. The method of claim 9 further comprising: receiving at a second computer the personal code for the individual provided by a gift giver, the second computer at a location remote from the first computer, the provider computer and the master database, and coupled to the master database, the provider computer and the first computer via the network; receiving a request for a type of offering to be provided to the individual and the personal code associated with the individual from the second computer over the network at a provider computer; receiving at the master database a database access code of the provider and the personal code of the individual from the provider computer; authenticating in the master database the database access code and the unique personal code; upon authentication, transmitting from the master database the characteristic information of the individual associated with the personal code and relevant to the type of offering to the provider computer; the provider computer selecting a particular offering of the requested type and corresponding to the characteristics of the individual; and transmitting information about the selected offering from the provider computer to the second computer.

12. The method of claim 9 wherein the characteristic information comprises size-related information.

13. The method of claim 9 wherein the characteristic information comprises clothing taste preferences.

14. The method of claim 9 wherein the characteristic information comprises footwear taste preferences.

15. The method of claim 9 wherein the characteristic information comprises clothing sizing information.

16. The method of claim 9 wherein the characteristic information comprises footwear sizing information.

17. In a system for assisting in purchasing-related activities, the system including a first computer coupled into a network, a provider computer of the first provider coupled into the network, and a master database coupled into the network, the master database comprising:

characteristic information provided by each of a plurality of individuals;

a unique personal code for each individual; for each of a plurality of providers, a database access code associated with each provider; programmed logic adapted to receive from the first computer at a remote location characteristic information of one of the individuals over the network, and further adapted to generate the unique personal code for the individual and send the unique personal code to the first computer; and programmed logic adapted to receive, from the provider computer, the provider computer at a location remote from the first computer and the master database, the database access code for the provider and the unique personal code of the individual and further adapted to authentication of the database access code and the personal code and transmission of the characteristic information of the individual relevant to the provider.

18. The system of claim 17 wherein the characteristic information comprises size-related information.

19. The system of claim 17 wherein the characteristic information comprises clothing taste preferences.

20. The system of claim 17 wherein the characteristic information comprises footwear taste preferences.

21. The system of claim 17 wherein the characteristic information comprises clothing sizing information.

22. The system of claim 17 wherein the characteristic information comprises footwear sizing information.

23. In a network including a first computer coupled to a network, a provider computer of a first provider coupled to the network, and a master database coupled to the network and storing characteristic information for each of a plurality of individuals, a unique personal code for each individual, and a database access code for each of a plurality of different providers, a method of assisting in activities related to purchasing an offering, wherein an offering may be either a good or a service, or both, the method comprising:

receiving characteristic information provided by one of the individuals over the network from the first computer at a remote location from the master database and the provider computer; generating the unique personal code for the individual in response to receiving the characteristic information; receiving a database access code of a provider and the unique personal code over the network from the provider computer at a location remote from the first computer and the master database; authenticating the database access code and the unique personal code; and upon authentication, the master database sending the characteristic information of the individual relevant to the provider to the provider computer over the network.

24. The system of claim 23 wherein the characteristic information comprises size-related information.

25. The system of claim 23 wherein the characteristic information comprises clothing taste preferences.

26. The system of claim 23 wherein the characteristic information comprises footwear taste preferences.

27. The system of claim 23 wherein the characteristic information comprises clothing sizing information.

28. The system of claim 23 wherein the characteristic information comprises footwear sizing information.

29. In a system for assisting in purchasing-related activities, the system including a first computer coupled into a network, the first computer adapted to receive characteristic information provided by an individual, and to transmit the characteristic information upon request of the individual

over a network to a remote master database coupled to the network, the master database comprising characteristic information for each of a plurality of individuals, a unique personal code for each individual, and a database access code for each of a plurality of different providers, and a provider computer of a first provider coupled into the network, the provider computer programmed to perform the operations of:

receiving from the first computer at a remote location a request for a type of offering and the unique personal code for the individual;

transmitting to the master database a database access code for the provider and the unique personal code of the individual;

receiving characteristic information of the individual relevant to the provider from the master database upon authentication of the database access code and the personal code;

selecting a particular offering of the requested type and corresponding to the characteristics of the individual; and

transmitting information about the selected offering to the first computer.

30. The system of claim 29 wherein the characteristic information comprises size-related information.

31. The system of claim 29 wherein the characteristic information comprises clothing taste preferences.

32. The system of claim 29 wherein the characteristic information comprises footwear taste preferences.

33. The system of claim 29 wherein the characteristic information comprises clothing sizing information.

34. The system of claim 29 wherein the characteristic information comprises footwear sizing information.

35. In a network including a first computer coupled to a network, the first computer adapted to receive characteristic information provided by an individual, and to transmit the characteristic information upon request of the individual over a network to a remote master database coupled to the network, the master database storing characteristic information for each of a plurality of individuals, a unique personal code for each individual, and a database access code for each of a plurality of different providers, and a provider computer of a first provider coupled into the network, a method of assisting in activities related to purchasing an offering, 45 wherein an offering may be either a good or a service, or both, the method comprising:

receiving from the first computer at a remote location a request for a type of offering and the unique personal code for the individual;

transmitting to the master database a database access code for the provider and the unique personal code of the individual;

receiving characteristic information of the individual relevant to the provider from the master database upon authentication of the database access code and the personal code;

selecting a particular offering of the requested type and corresponding to the characteristics of the individual; and

transmitting information about the selected offering to the first computer.

36. The system of claim 35 wherein the characteristic information comprises size-related information.

37. The system of claim 35 wherein the characteristic information comprises clothing taste preferences.

38. The system of claim 35 wherein the characteristic information comprises footwear taste preferences.

39. The system of claim 35 wherein the characteristic information comprises clothing sizing information.

40. The system of claim 35 wherein the characteristic information comprises footwear sizing information.

41. In a system for assisting a gift giver in purchasing a gift for an individual, the system including a first computer coupled into a network, the first computer adapted to receive characteristic information provided by an individual, to transmit the characteristic information upon request of the individual over a network to a remote master database and to receive a unique personal code from the master database, a second computer coupled into the network, the master database storing characteristic information for each of a plurality of individuals, a unique personal code for each individual, and a database access code for each of a plurality of different providers, and a provider computer of a first provider coupled into the network, the provider computer adapted to transmit the database access code of the first provider and the unique personal code of one of the individuals to the master database, upon authentication of the database access code and the unique personal code by the master database, to receive the characteristic information of the individual, and select a particular offering of a requested type and corresponding to the characteristics of the individual, the second computer programmed to perform the operations of:

receiving a unique personal code for the individual provided by a gift giver;

transmitting over the network a request for a type of offering to be provided to the individual and the unique personal code for the individual to the provider computer at a location remote from the first computer, the second computer and the master database, wherein the provider computer selects a particular offering of the requested type and corresponding to the characteristics of the individual; and

receiving information about the selected offering from the provider computer.

42. The system of claim 41 wherein the characteristic information comprises size-related information.

43. The system of claim 41 wherein the characteristic information comprises clothing taste preferences.

44. The system of claim 41 wherein the characteristic information comprises footwear taste preferences.

45. The system of claim 41 wherein the characteristic information comprises clothing sizing information.

46. The system of claim 41 wherein the characteristic information comprises footwear sizing information.

47. In a network including a first computer coupled to a network, a first computer coupled into a network, the first computer adapted to receive characteristic information provided by an individual, to transmit the characteristic information upon request of the individual over a network to a remote master database and to receive a unique personal code from the master database, a second computer coupled into a network, the master database coupled to the network comprising characteristic information for each of a plurality of individuals, a unique personal code for each individual, and a database access code for each of a plurality of different providers, and a provider computer of a first provider coupled into the network, the provider computer adapted to transmit the database access code of the first provider and the unique personal code of the individual to the master database, upon authentication of the database access code and the unique personal code by the master database, to

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receive the characteristic information of the individual, and select a particular offering of a requested type and corresponding to the characteristics of the individual, a method of assisting a gift giver in purchasing a gift for an individual, the method comprising:

- receiving a unique personal code for the individual provided by a gift giver;
- transmitting over the network a request for a type of offering to be provided to the individual and the unique personal code for the individual to the provider computer at a location remote from the first computer, the second computer and the master database, wherein the provider computer selects a particular offering of the requested type and corresponding to the characteristics of the individual; and
- receiving information about the selected offering from the provider computer.

48. The system of claim 47 wherein the characteristic information comprises size-related information.

49. The system of claim 47 wherein the characteristic information comprises clothing taste preferences.

50. The system of claim 47 wherein the characteristic information comprises footwear taste preferences.

51. The system of claim 47 wherein the characteristic information comprises clothing sizing information.

52. The system of claim 47 wherein the characteristic information comprises footwear sizing information.

53. In a network including a first computer coupled to a network, the first computer adapted to receive characteristic information provided by an individual, and to transmit the characteristic information upon request of the individual over a network to a remote master database coupled to the network, the master database storing characteristic information for each of a plurality of individuals, a unique personal code for each individual, and a database access code for each of a plurality of different providers, and a provider computer of a first provider coupled into the network, a computer usable medium comprising instructions embodied thereon, which when executed by a processor cause the processor to perform a method of assisting in activities related to purchasing an offering, wherein an offering may be either a good or a service, or both, the method comprising:

- receiving from the first computer at a remote location a request for a type of offering and the unique personal code for the individual;

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transmitting to the master database a database access code for the provider and the unique personal code of the individual;

receiving characteristic information of the individual relevant to the provider from the master database upon authentication of the database access code and the personal code;

selecting a particular offering of the requested type and corresponding to the characteristics of the individual; and

transmitting information about the selected offering to the first computer.

54. In a network including a first computer coupled to a network, a provider computer of a first provider coupled to the network, and a master database coupled to the network and storing characteristic information for each of a plurality of individuals, a unique personal code for each individual, and a database access code for each of a plurality of different providers, a computer usable medium comprising instructions embodied thereon, which when executed by a processor cause the processor to perform a method of assisting in activities related to purchasing an offering, wherein an offering may be either a good or a service, or both, the method comprising:

receiving characteristic information provided by one of the individuals over the network from the first computer at a remote location from the master database and the provider computer;

generating the unique personal code for the individual in response to receiving the characteristic information;

receiving a database access code of a provider and the unique personal code over the network from the provider computer at a location remote from the first computer and the master database;

authenticating the database access code and the unique personal code; and

upon authentication, the master database sending the characteristic information of the individual relevant to the provider to the provider computer over the network.

\* \* \* \* \*

**Evidence Appendix C (37 C.F.R. § 41.37(c)(1)(ix))**

**U.S. Patent No. 7,107,235 to Lyden**

This patent was originally made of record and relied upon by the Office in the Final Office Action mailed December 6, 2007.



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(12) **United States Patent**  
**Lyden**

(10) **Patent No.:** US 7,107,235 B2  
(45) **Date of Patent:** \*Sep. 12, 2006

(54) **METHOD OF CONDUCTING BUSINESS INCLUDING MAKING AND SELLING A CUSTOM ARTICLE OF FOOTWEAR**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 711 days.

This patent is subject to a terminal disclaimer.

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(52) **U.S. Cl.** ..... 705/26; 36/37; 36/38

(58) **Field of Classification Search** ..... 705/26,  
705/27; 36/37, 38

See application file for complete search history.

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(57) **ABSTRACT**

The present invention teaches a method of conducting retail and Internet business including making and delivering a custom article of footwear. The article of footwear taught in the present invention includes a spring element that can provide improved cushioning, stability, and running economy. Unlike the conventional foam materials presently being used by the footwear industry, a preferred spring element is not substantially subject to compression set degradation and can provide a relatively long service life. The components of the article of footwear including the upper, insole, heel counter, spring element, and sole can be selected from a range of options, and can be easily removed and replaced, as desired. Accordingly, the present invention also teaches a method of making a custom article of footwear.

75 Claims, 201 Drawing Sheets

- [A number of connecting buttons including setting and defining a custom article of footwear comprising the steps of:]
- [a] Collecting data relating to an individual, and setting and defining a custom article of footwear and measurements of said individual's feet;
- [b] Creating from said collected data references for and intelligence for acting said custom article of footwear for said individual(s);
- [c] Providing a plurality of footwear components, and a plurality of combinations of selected footwear components, and factoring at least one factoring component;
- [d] Selecting from said plurality of footwear components, and a combination of selected footwear components, and factoring at least one factoring component;
- [e] Providing said information and intelligence further defining the individual, and the selected components, which said custom article of footwear can be made;
- [f] Specifying according a plurality of said selected components, and a combination of selected components, with said at least one factoring component, to define the making of said custom article of footwear, and;
- [g] Delivering said custom article of footwear to be delivered to a designated address.

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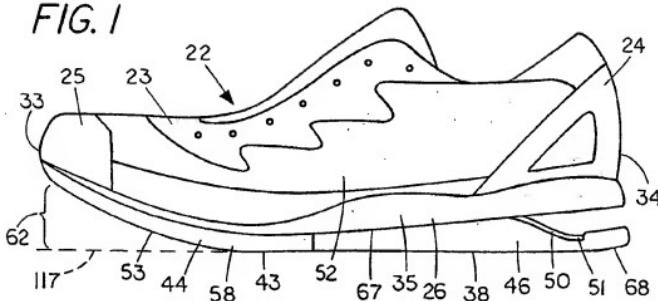
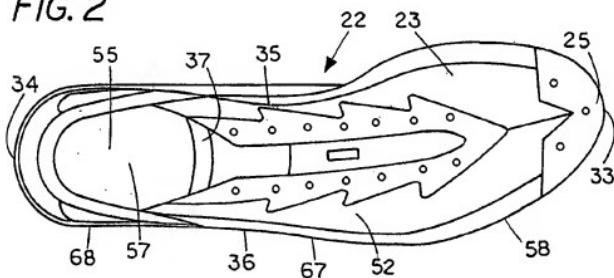
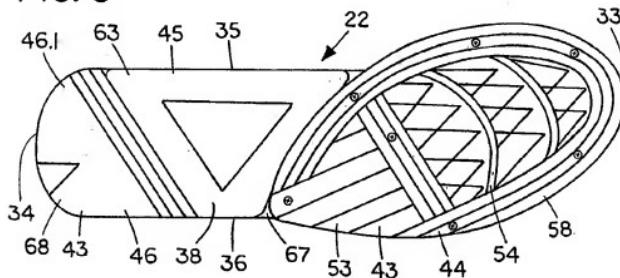
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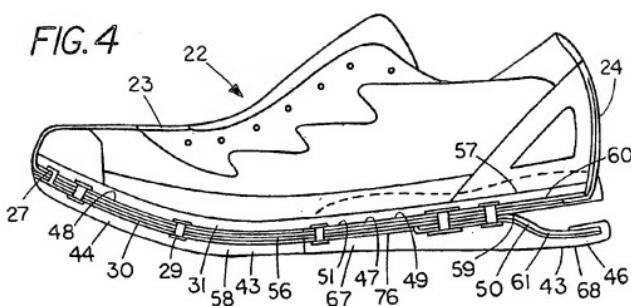
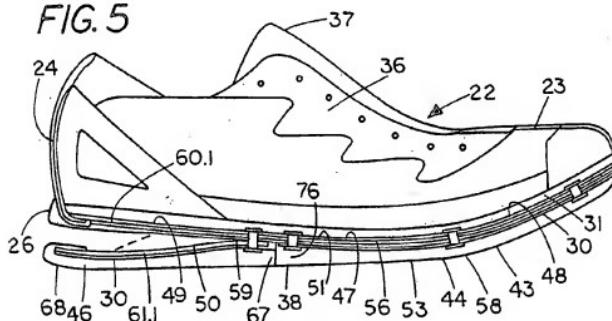
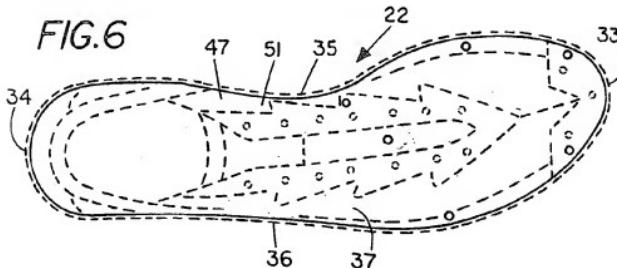
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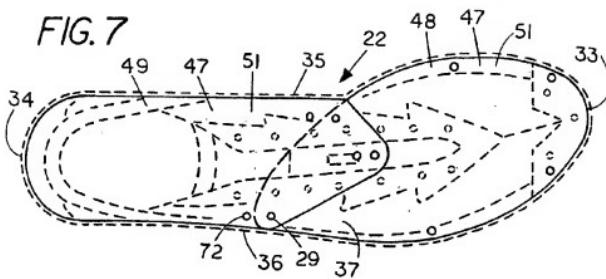
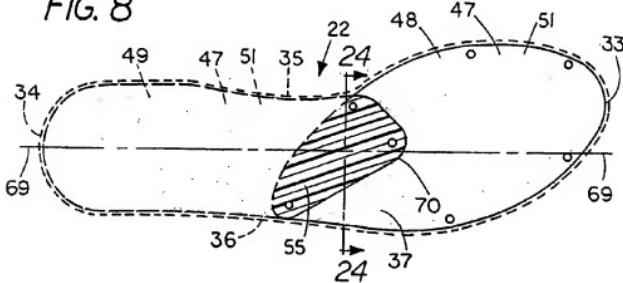
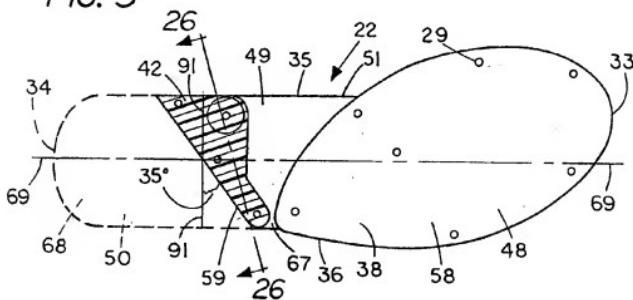
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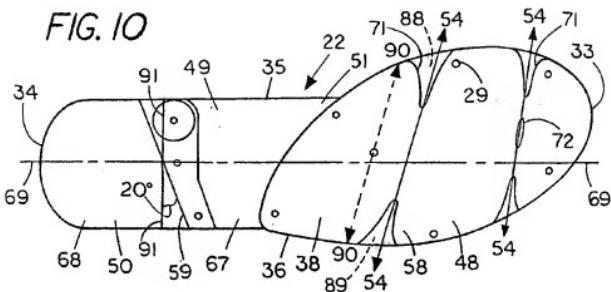
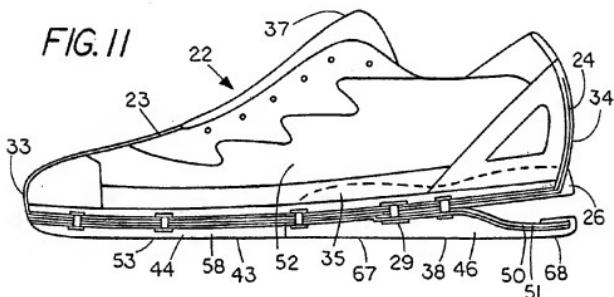
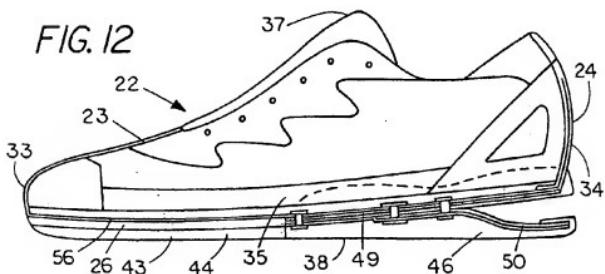
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*FIG. 1**FIG. 2**FIG. 3*

*FIG. 4**FIG. 5**FIG. 6*

*FIG. 7**FIG. 8**FIG. 9*

*FIG. 10**FIG. 11**FIG. 12*

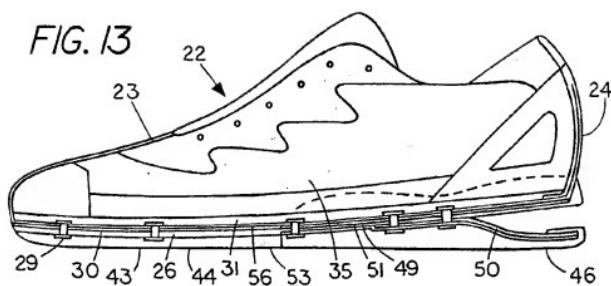
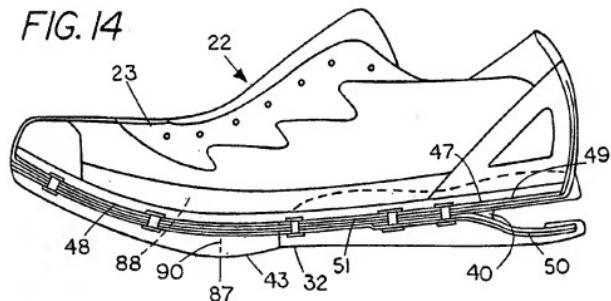
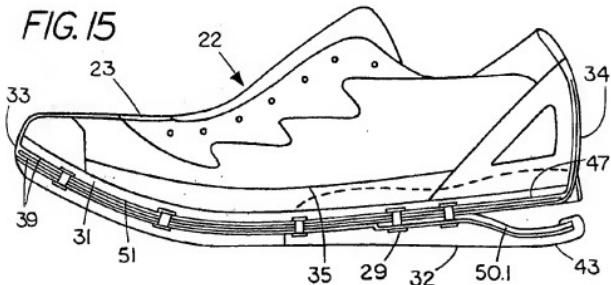
*FIG. 13**FIG. 14**FIG. 15*

FIG. 16

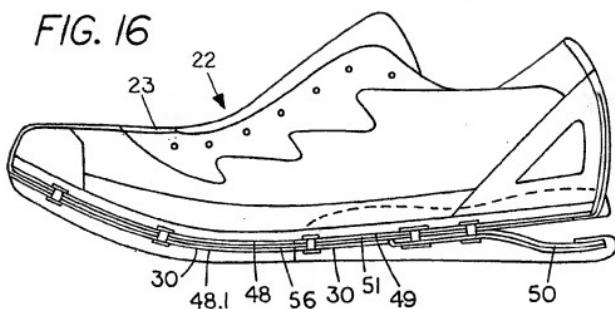


FIG. 17

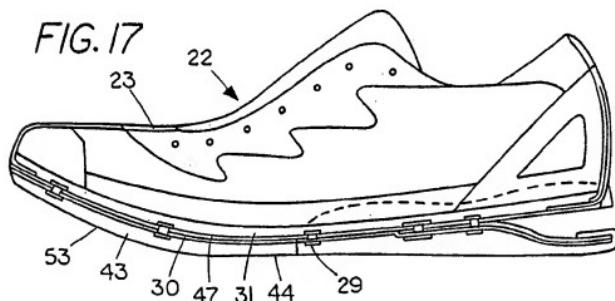
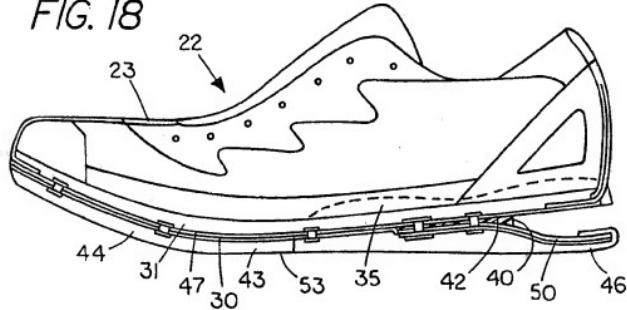
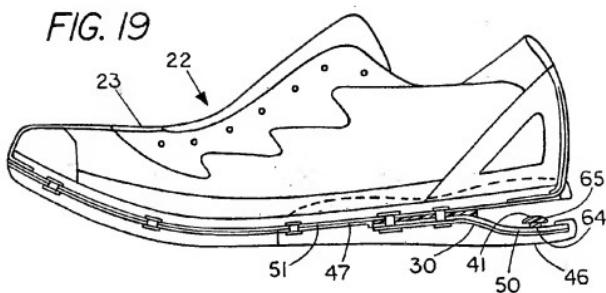
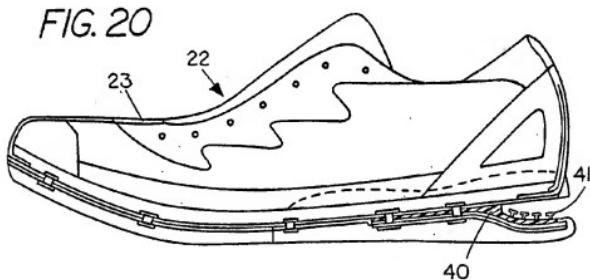
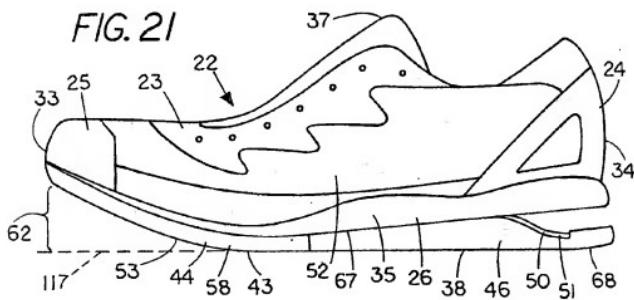
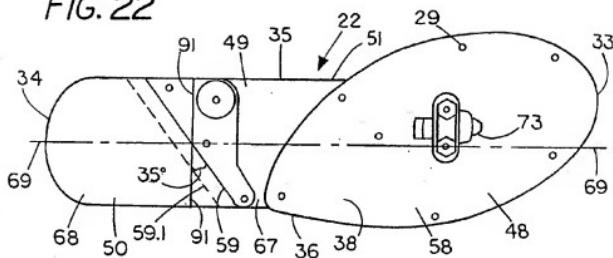
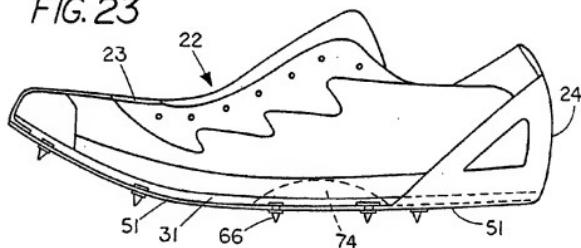
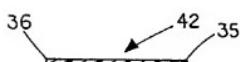
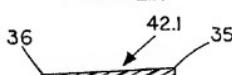
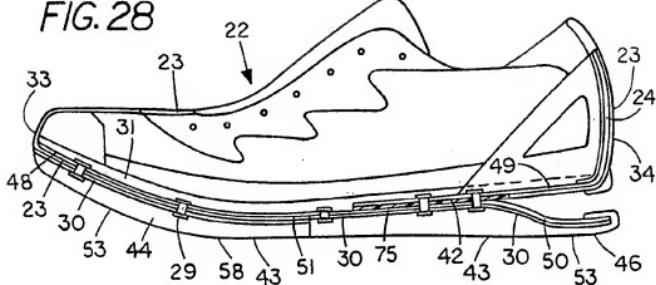
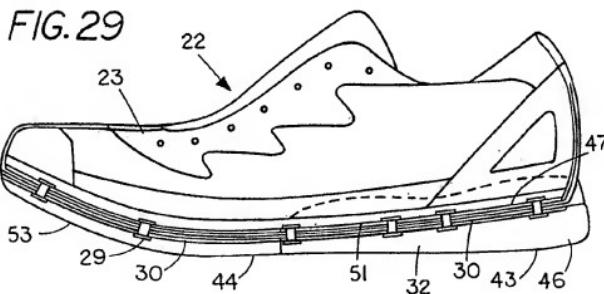


FIG. 18



*FIG. 19**FIG. 20**FIG. 21*

*FIG. 22**FIG. 23**FIG. 24**FIG. 25**FIG. 26**FIG. 27*

*FIG. 28**FIG. 29*

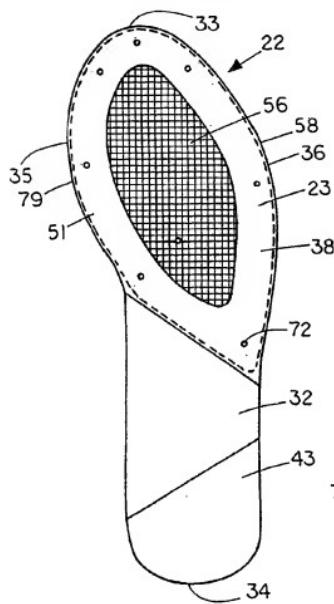
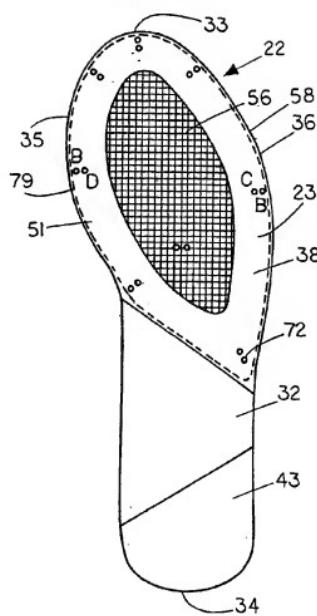
*FIG. 30**FIG. 31*

FIG. 32

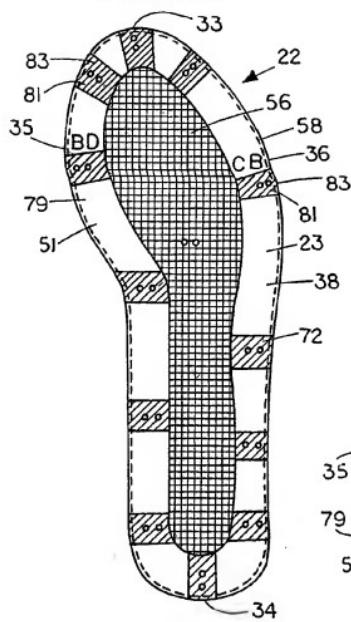


FIG. 33

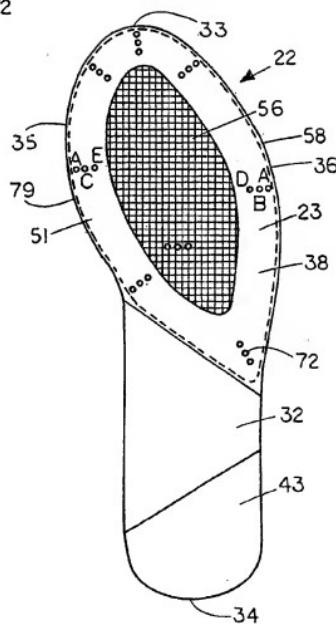


FIG. 34

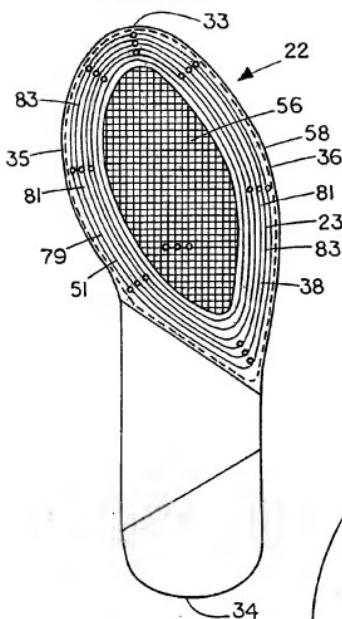
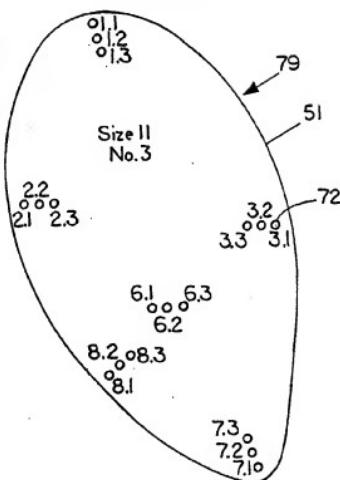
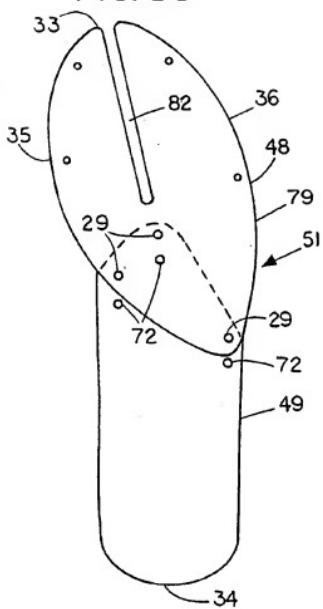
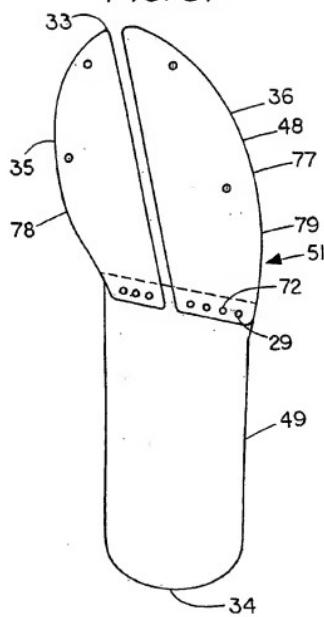


FIG. 35



*FIG. 36**FIG. 37*

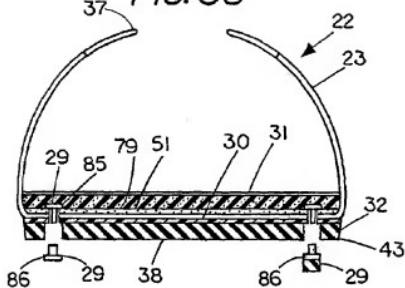
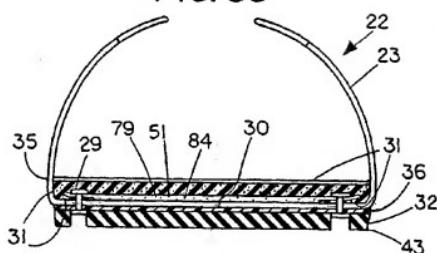
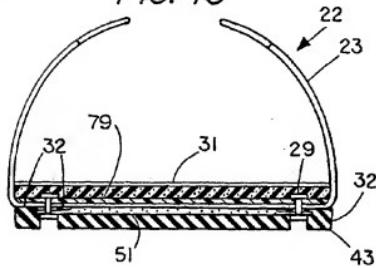
*FIG. 38**FIG. 39**FIG. 40*

FIG. 41

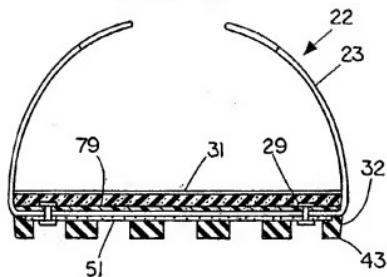


FIG. 42

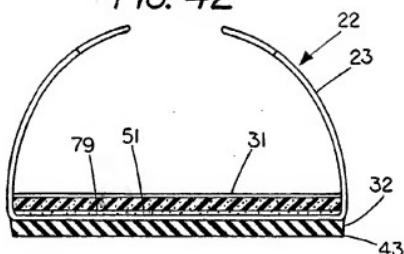
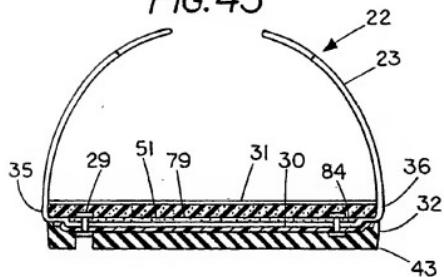
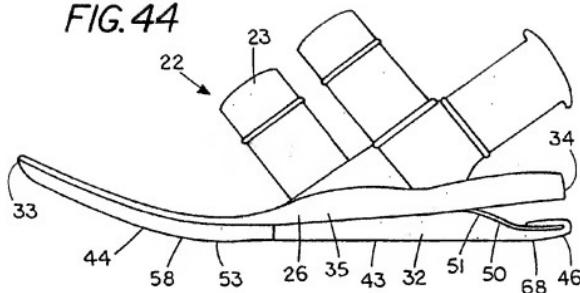
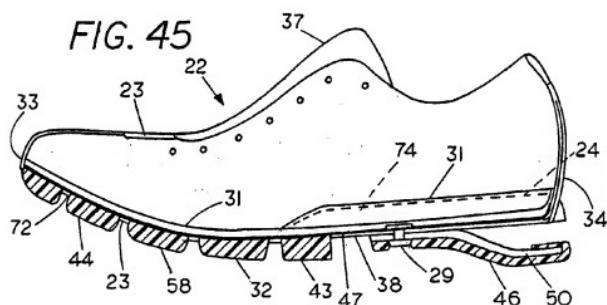
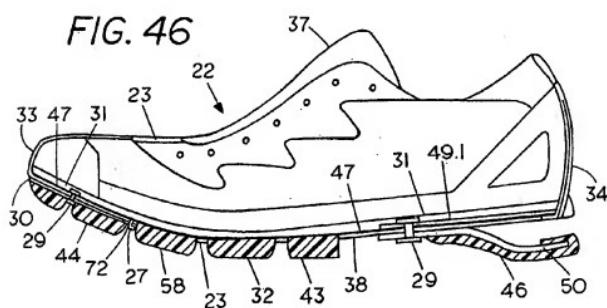


FIG. 43



*FIG. 44**FIG. 45**FIG. 46*

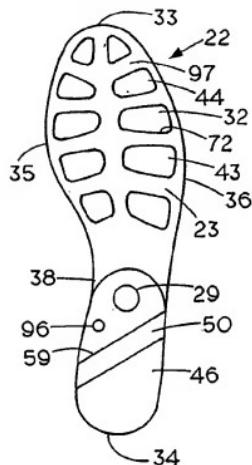
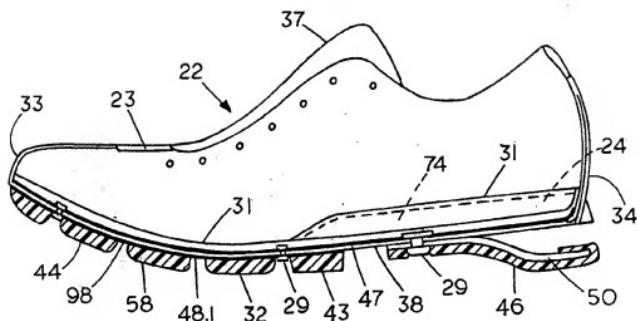
*FIG. 47**FIG. 48*

FIG. 49

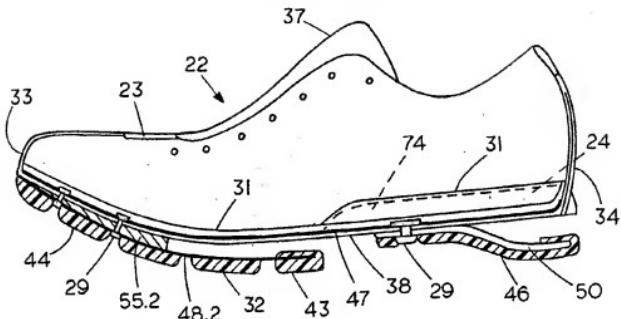


FIG. 50

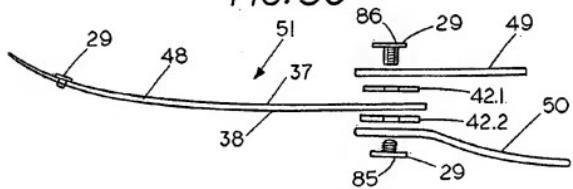
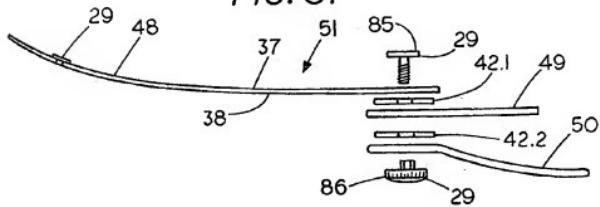
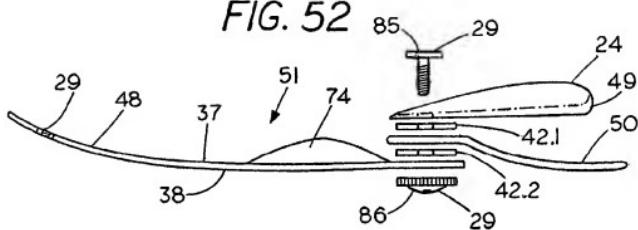
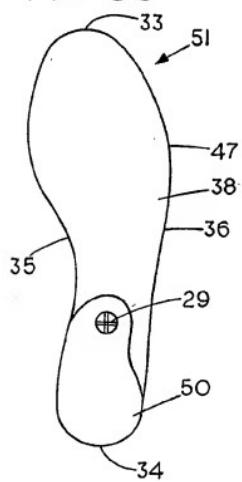
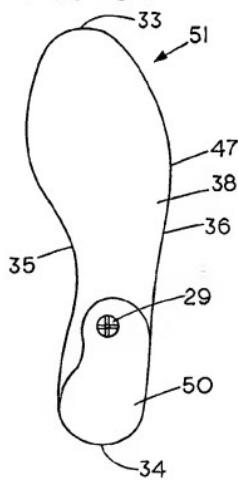


FIG. 51



*FIG. 52**FIG. 53**FIG. 54*

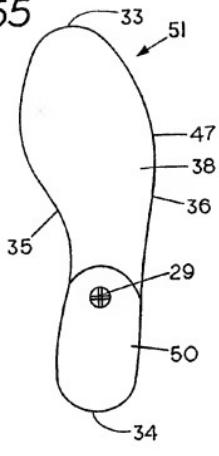
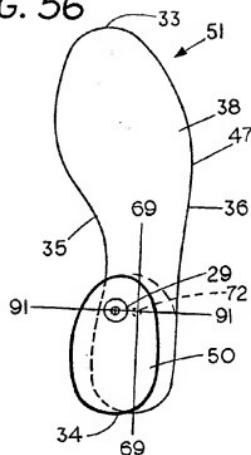
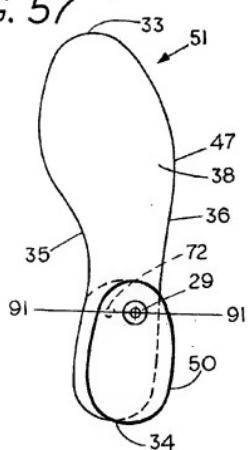
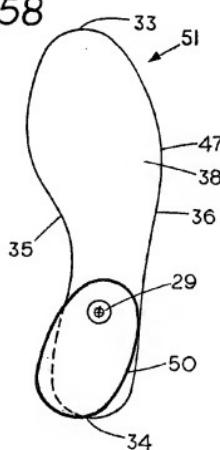
*FIG. 55**FIG. 56**FIG. 57**FIG. 58*

FIG. 59

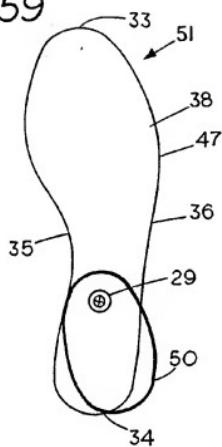


FIG. 60

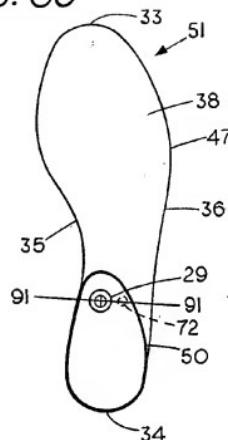


FIG. 61

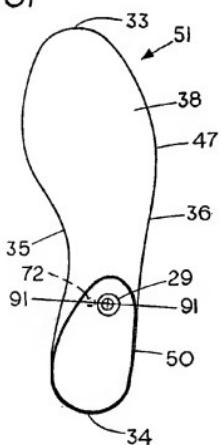


FIG. 62

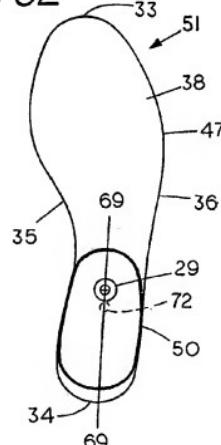


FIG. 63

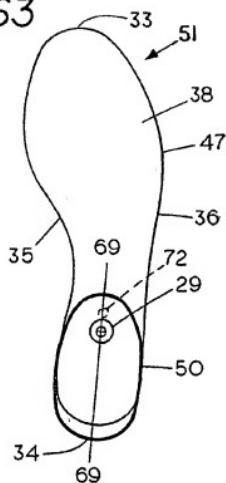


FIG. 64

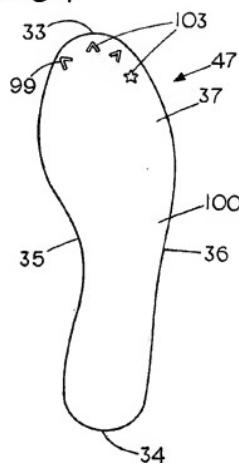


FIG. 65

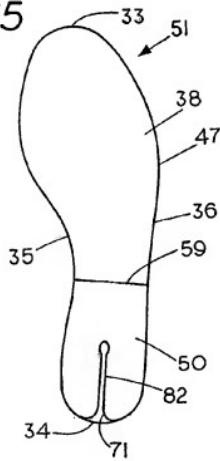
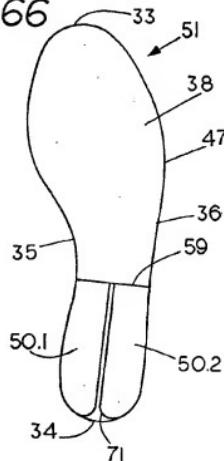
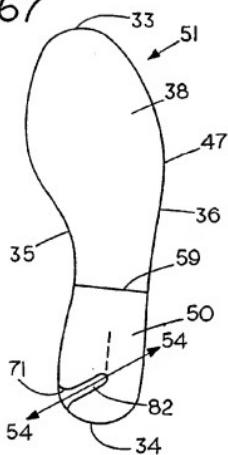
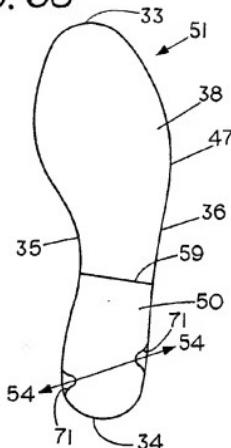
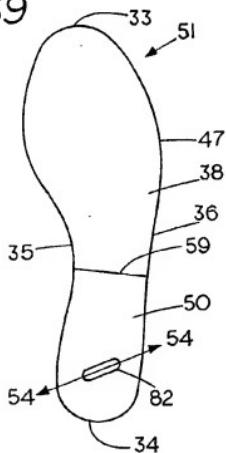
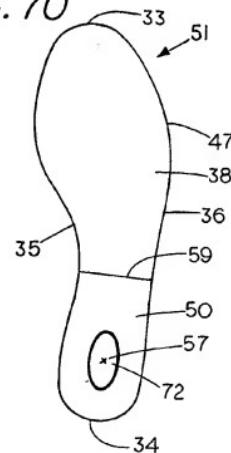


FIG. 66



*FIG. 67**FIG. 68**FIG. 69**FIG. 70*

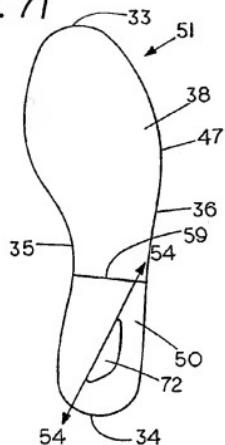
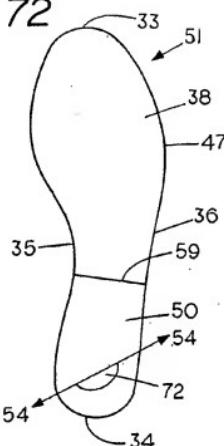
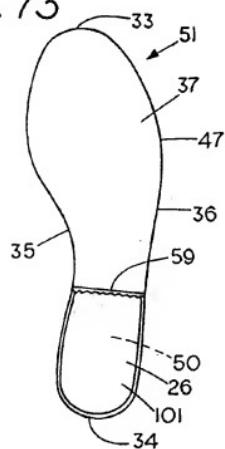
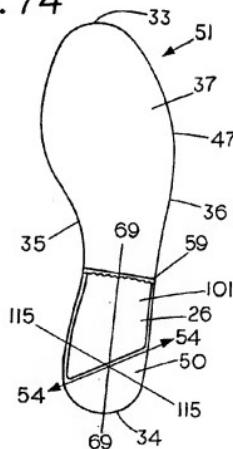
*FIG. 71**FIG. 72**FIG. 73**FIG. 74*

FIG. 75

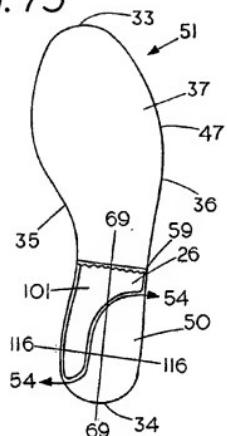


FIG. 76

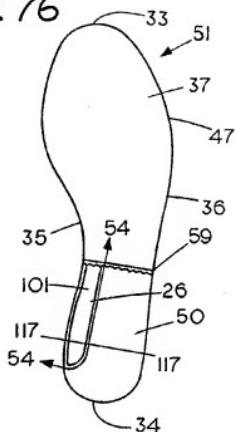


FIG. 77

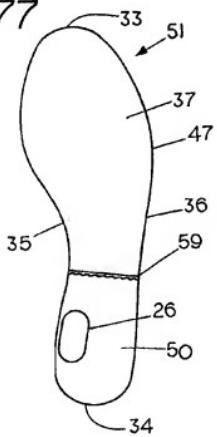


FIG. 78

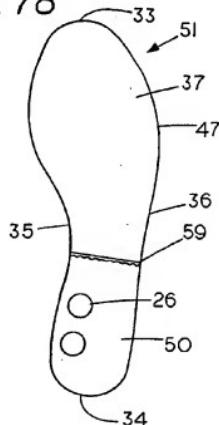


FIG. 79

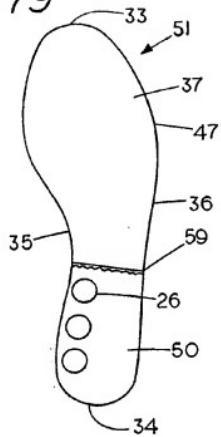


FIG. 80

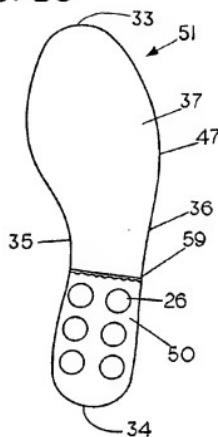


FIG. 81

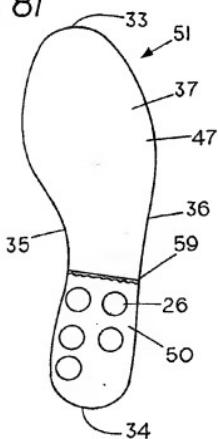
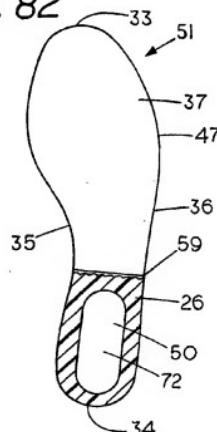
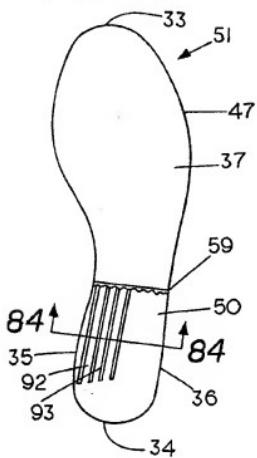
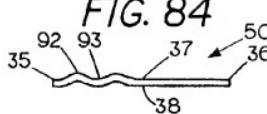
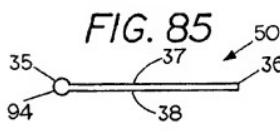
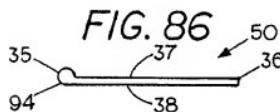
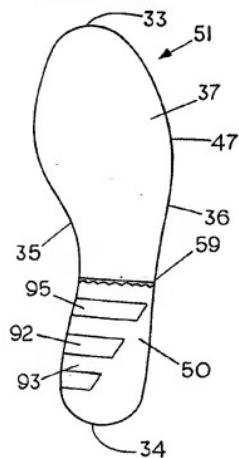
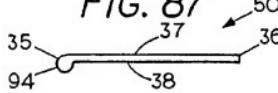
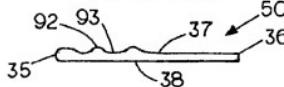
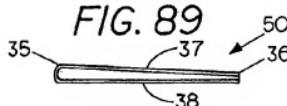


FIG. 82



**FIG. 83****FIG. 84****FIG. 85****FIG. 86****FIG. 90****FIG. 87****FIG. 88****FIG. 89**

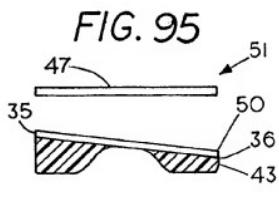
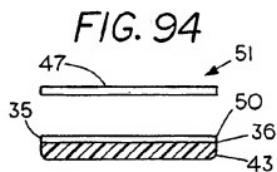
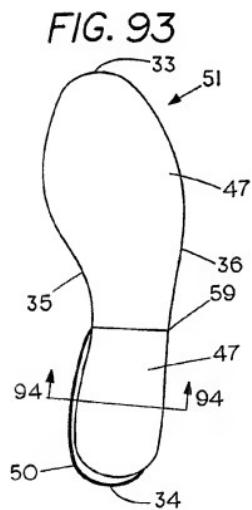
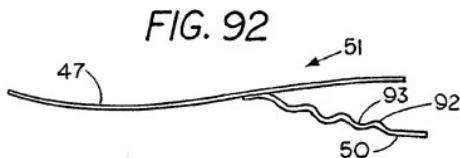
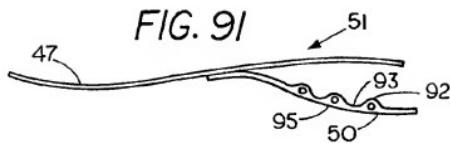


FIG. 96

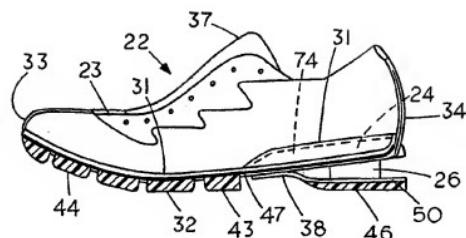


FIG. 97

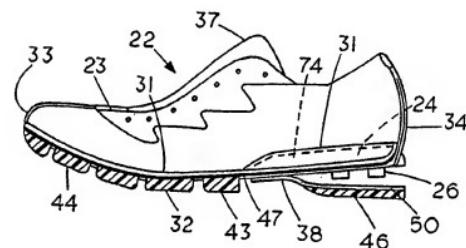


FIG. 98

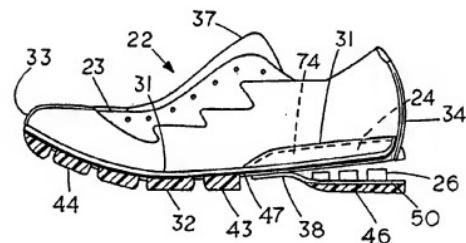


FIG. 99

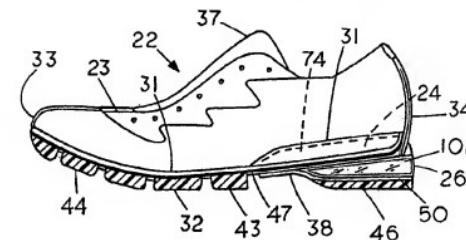


FIG. 100

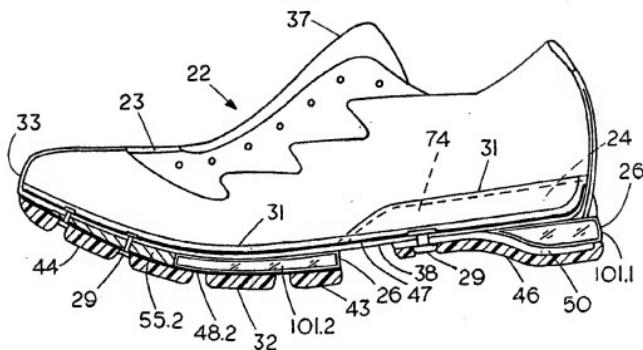


FIG. 101

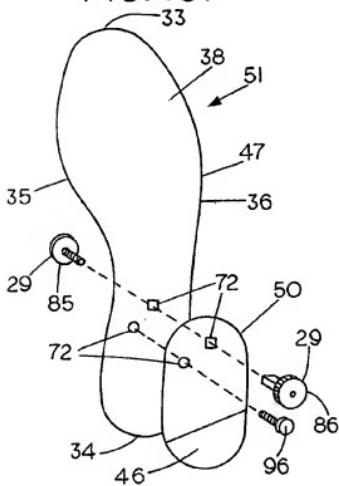


FIG. 102

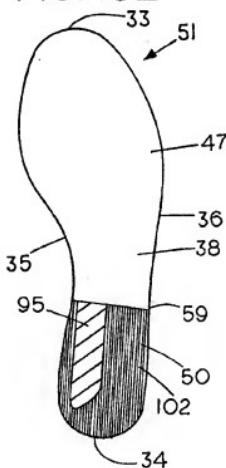


FIG. 103

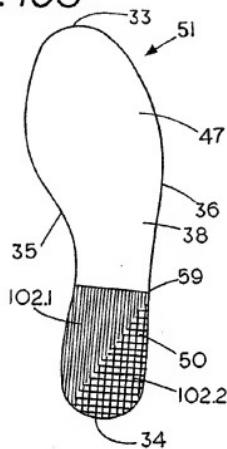


FIG. 104

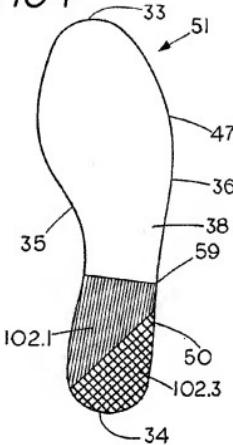


FIG. 105

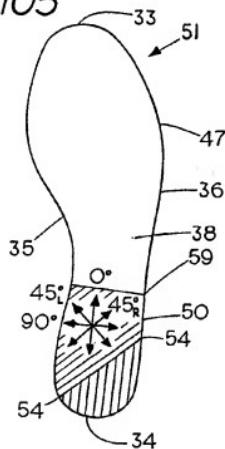
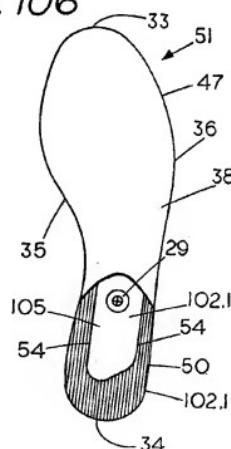
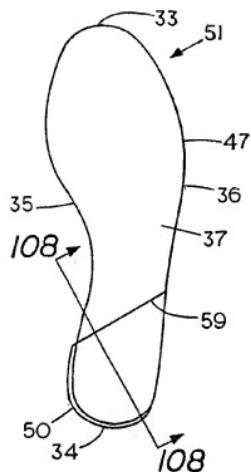
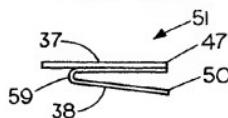
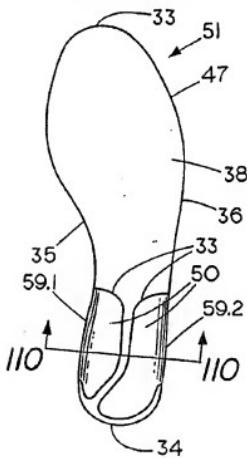
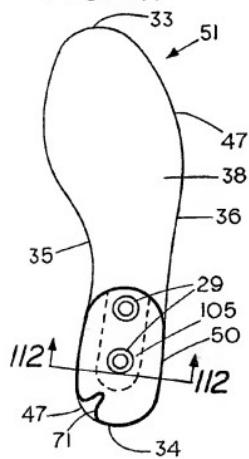
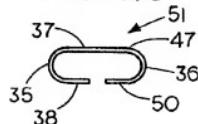
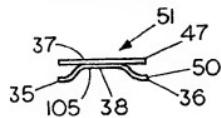
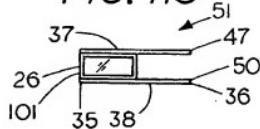
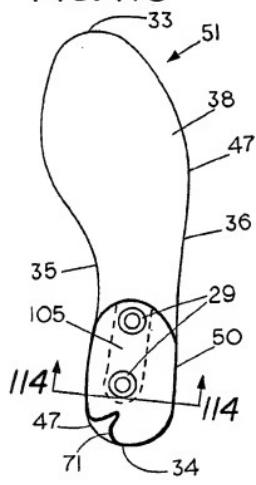
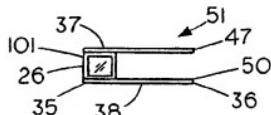
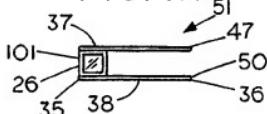
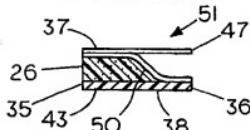
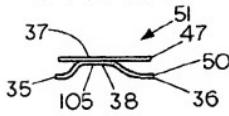
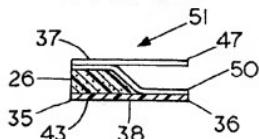
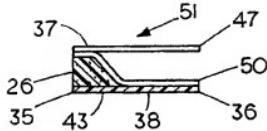
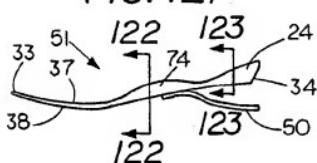
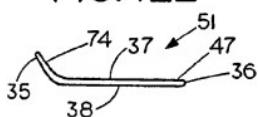
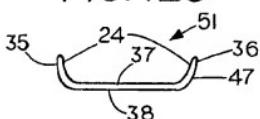
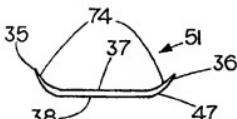
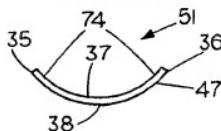
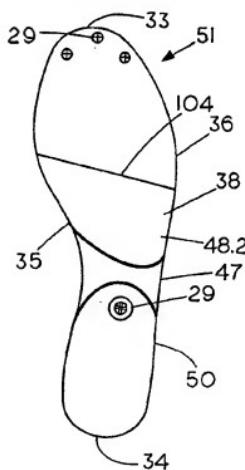


FIG. 106



*FIG. 107**FIG. 108**FIG. 109**FIG. 111**FIG. 110*

**FIG. 112****FIG. 115****FIG. 113****FIG. 116****FIG. 117****FIG. 118****FIG. 114****FIG. 119**

**FIG. 120****FIG. 121****FIG. 122****FIG. 123****FIG. 124****FIG. 125****FIG. 126**

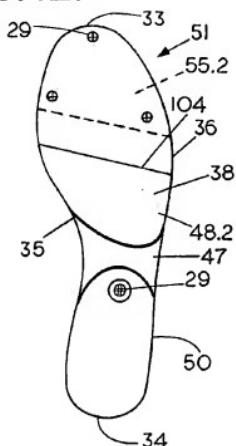
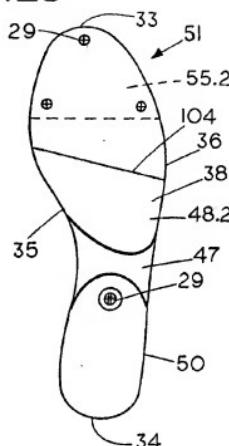
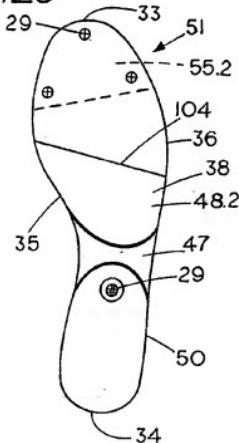
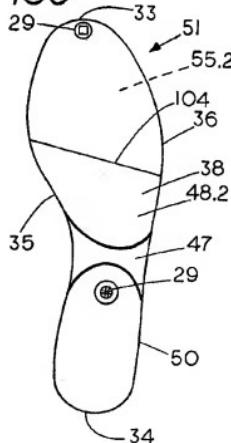
*FIG. 127**FIG. 128**FIG. 129**FIG. 130*

FIG. 131

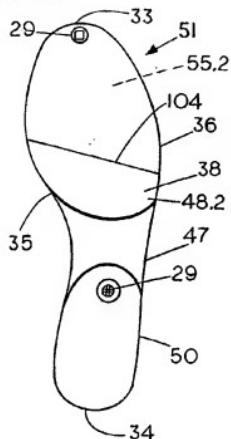


FIG. 132

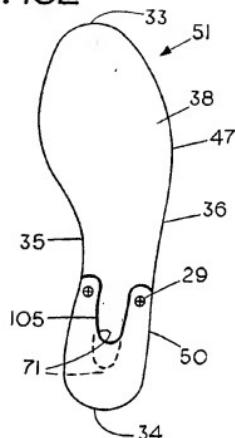


FIG. 133

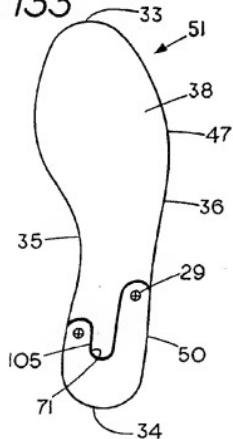
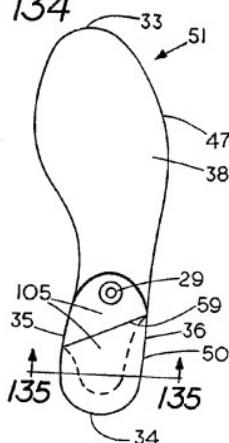
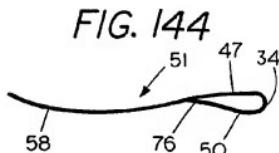
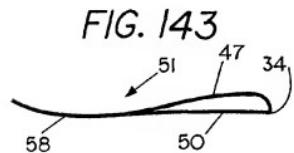
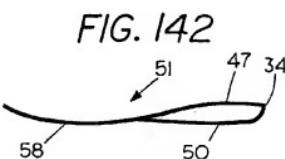
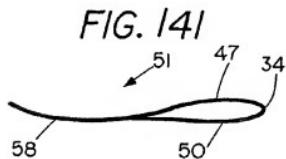
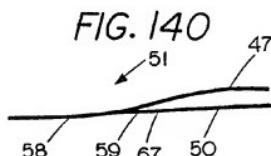
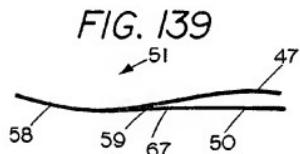
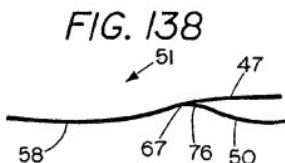
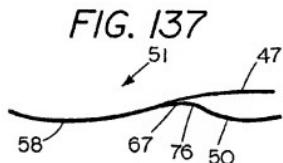
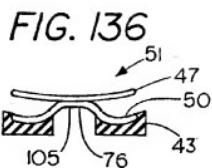
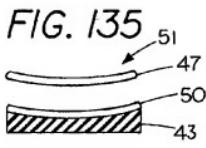
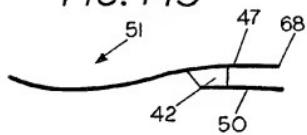
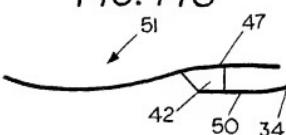
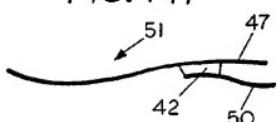
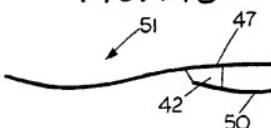
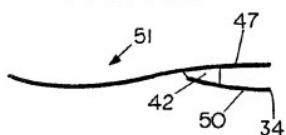
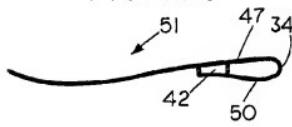
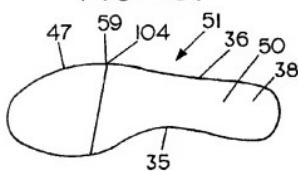
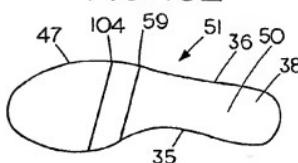
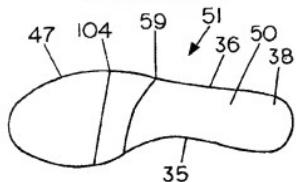
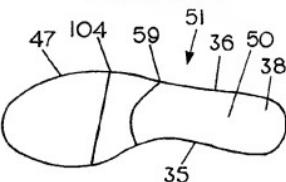
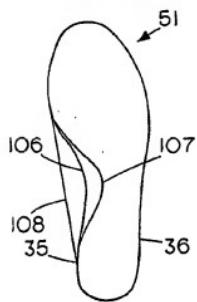
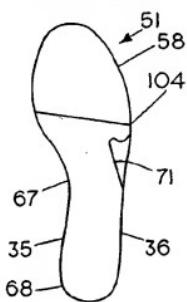
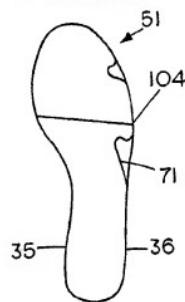
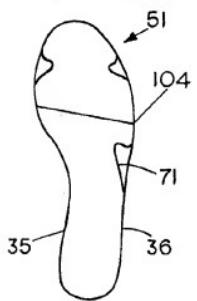
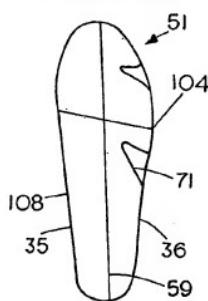
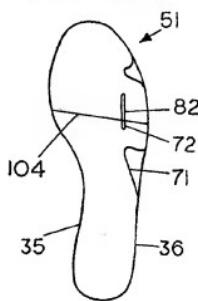


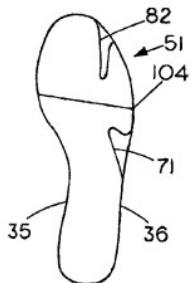
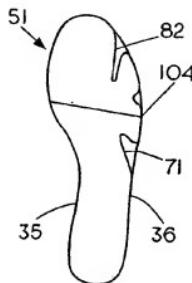
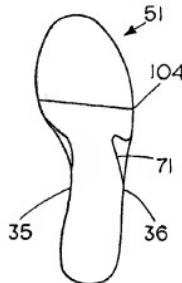
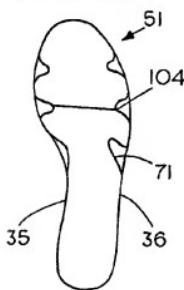
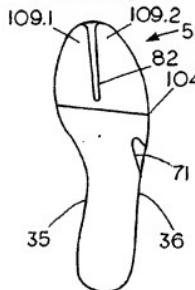
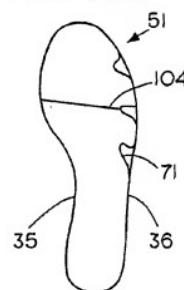
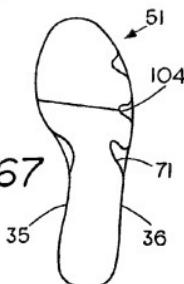
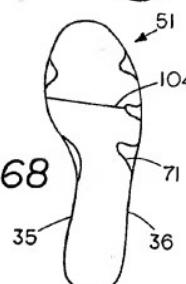
FIG. 134

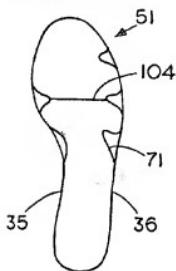
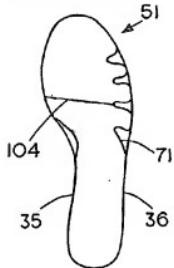
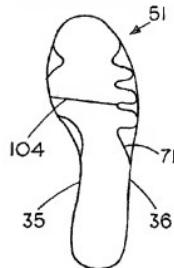
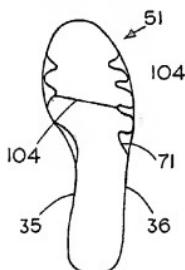
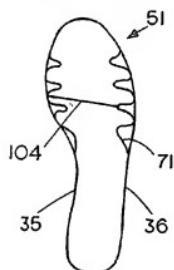
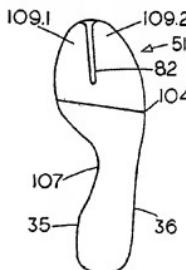
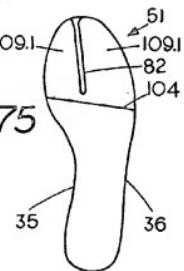
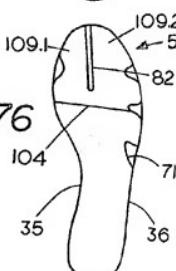


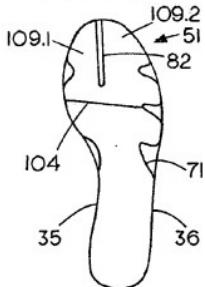
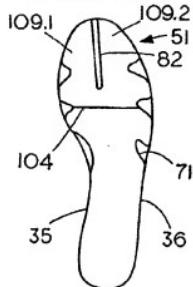
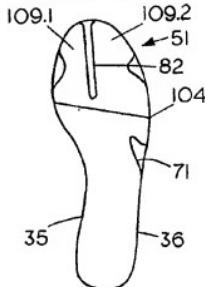
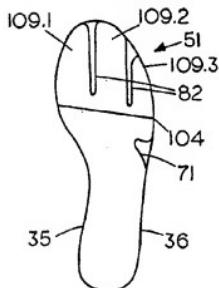
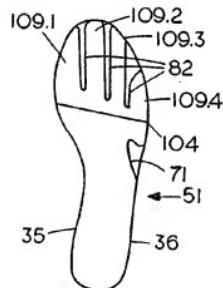
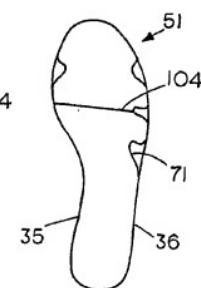
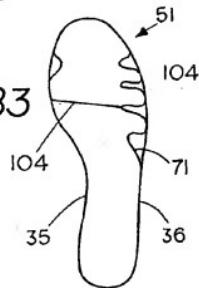
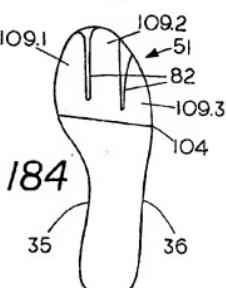


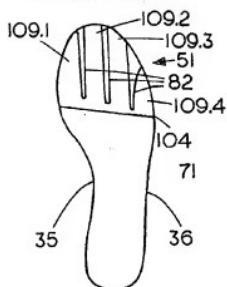
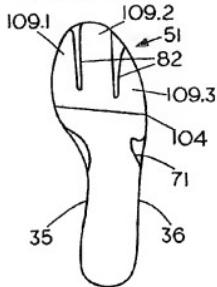
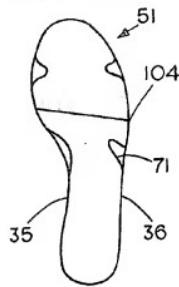
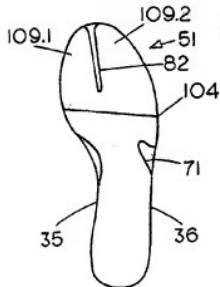
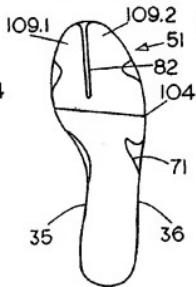
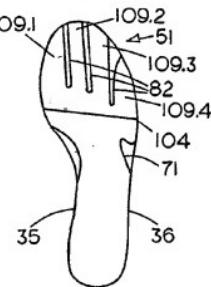
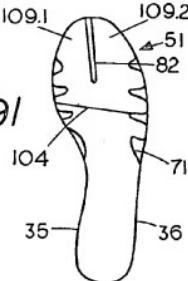
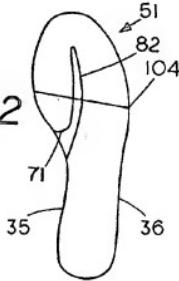
**FIG. 145****FIG. 146****FIG. 147****FIG. 148****FIG. 149****FIG. 150****FIG. 151****FIG. 152**

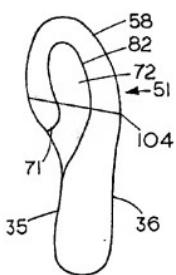
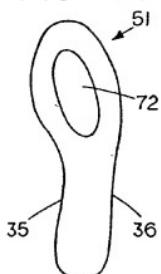
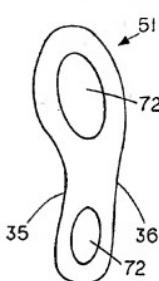
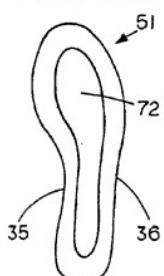
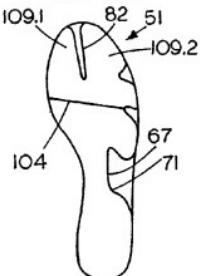
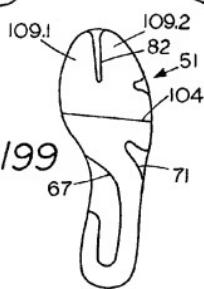
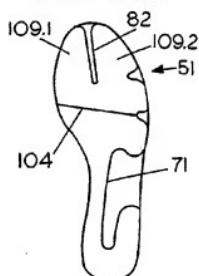
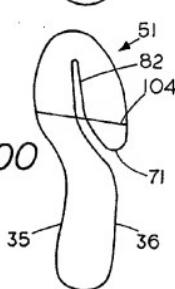
*FIG. 153**FIG. 154**FIG. 155**FIG. 156**FIG. 157**FIG. 158**FIG. 159**FIG. 160*

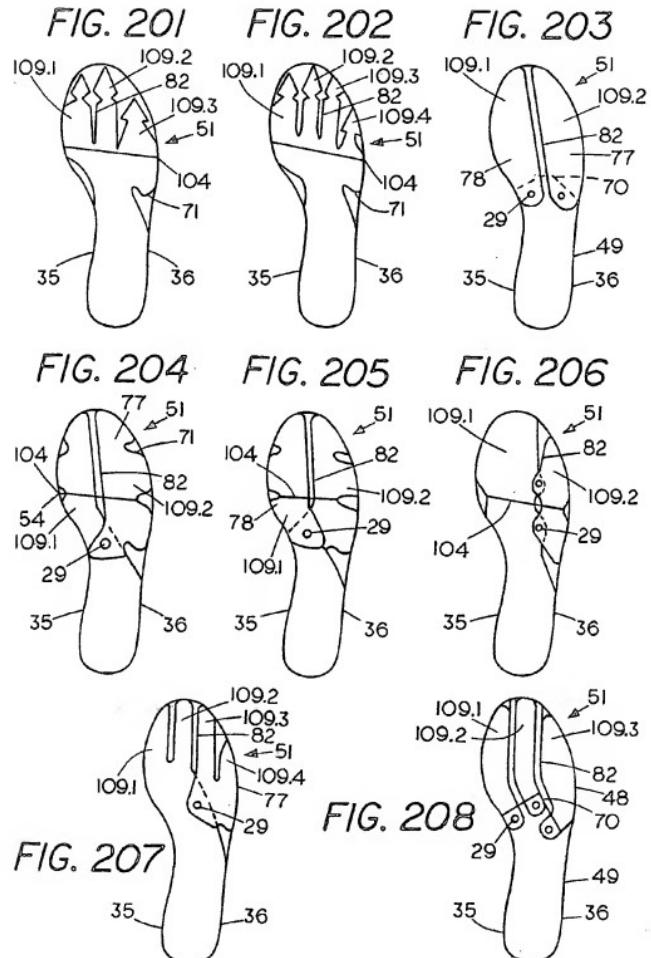
*FIG. 161**FIG. 162**FIG. 163**FIG. 164**FIG. 165**FIG. 166**FIG. 167**FIG. 168*

**FIG. 169****FIG. 170****FIG. 171****FIG. 172****FIG. 173****FIG. 174****FIG. 175****FIG. 176**

**FIG. 177****FIG. 178****FIG. 179****FIG. 180****FIG. 181****FIG. 182****FIG. 183****FIG. 184**

**FIG. 185****FIG. 186****FIG. 187****FIG. 188****FIG. 189****FIG. 190****FIG. 191****FIG. 192**

**FIG. 193****FIG. 194****FIG. 195****FIG. 196****FIG. 197****FIG. 198****FIG. 199****FIG. 200**



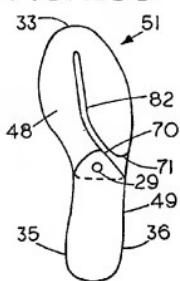
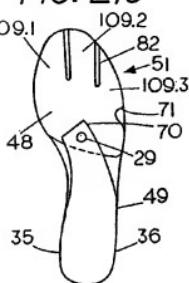
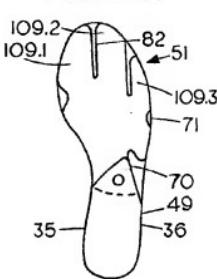
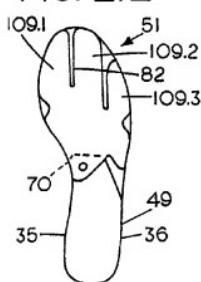
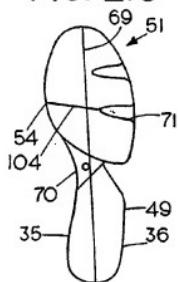
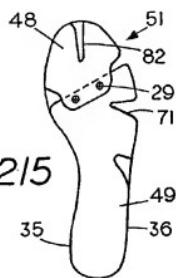
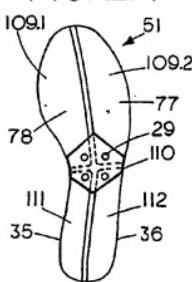
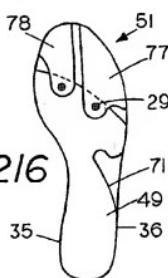
*FIG. 209**FIG. 210**FIG. 211**FIG. 212**FIG. 213**FIG. 214**FIG. 215**FIG. 216*

FIG. 217

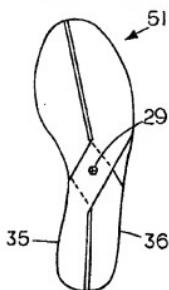


FIG. 218

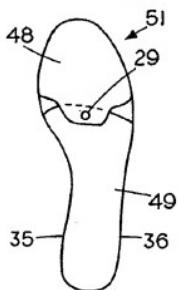
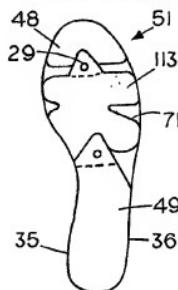


FIG. 219



*FIG. 220*

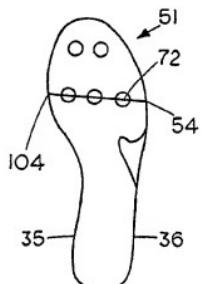
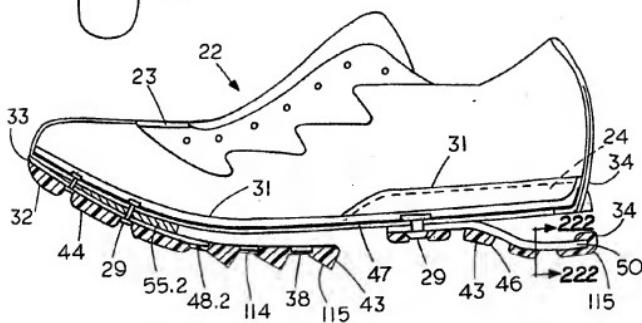


FIG. 221



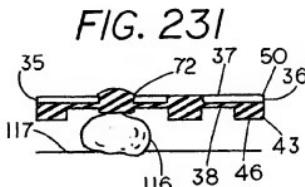
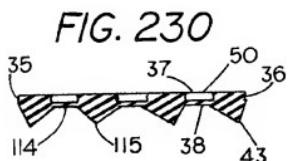
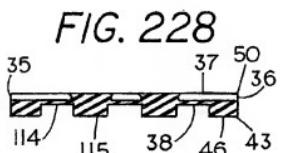
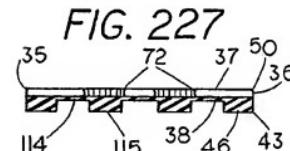
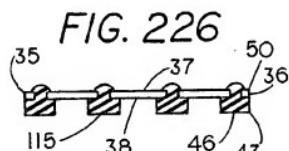
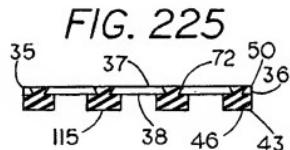
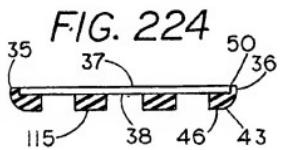
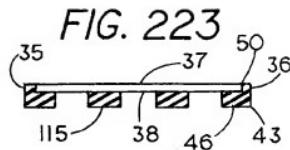
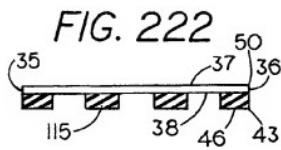


FIG. 232

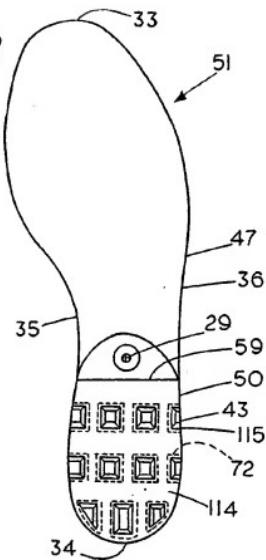


FIG. 233

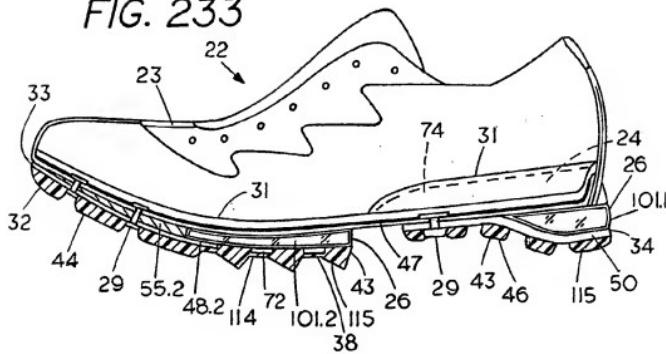


FIG. 234

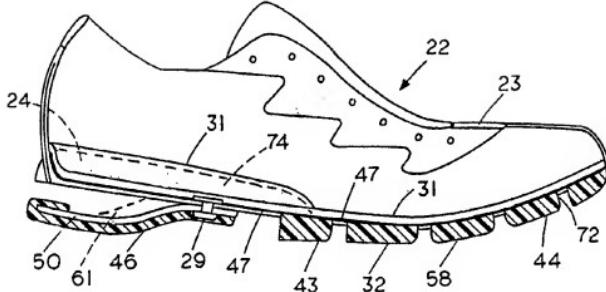


FIG. 235

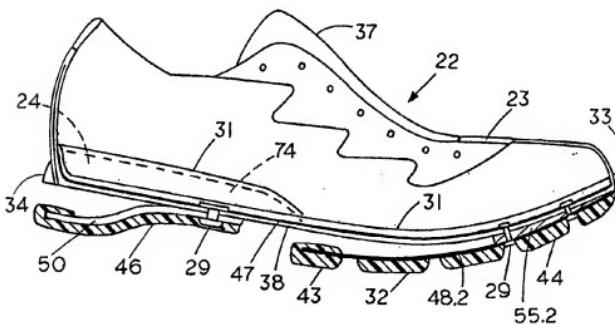


FIG. 236

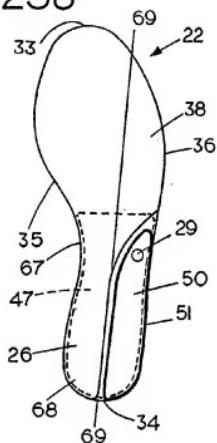


FIG. 237

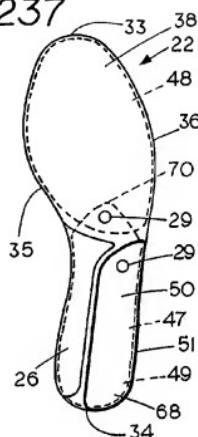


FIG. 238

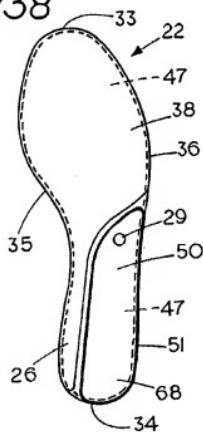


FIG. 239

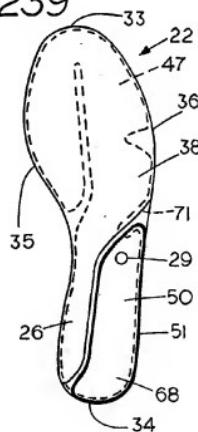


FIG. 240

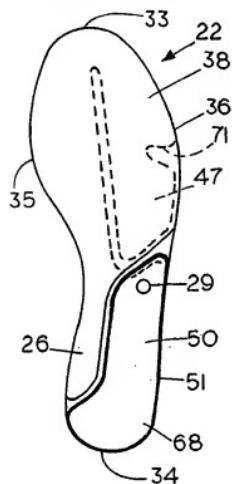


FIG. 241

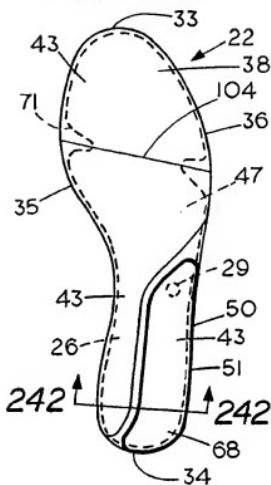
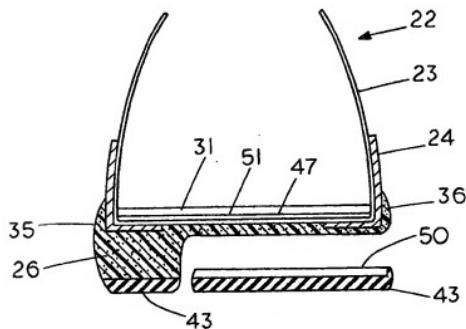


FIG. 242



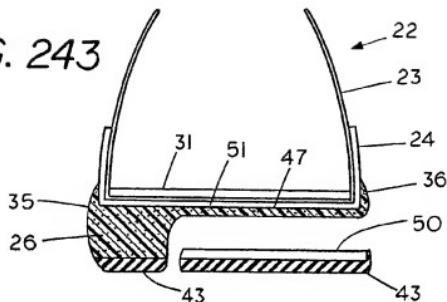
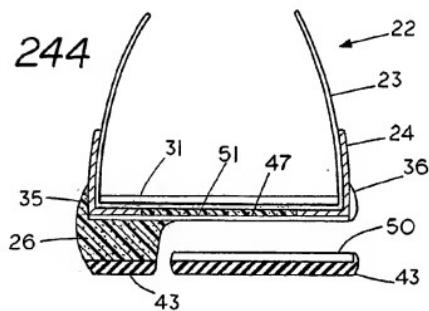
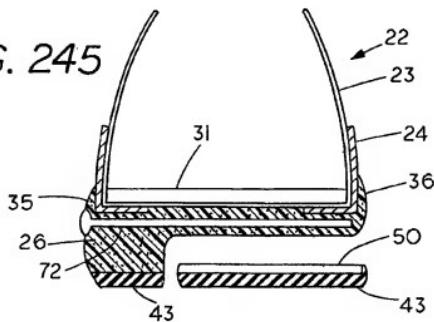
*FIG. 243**FIG. 244**FIG. 245*

FIG. 246

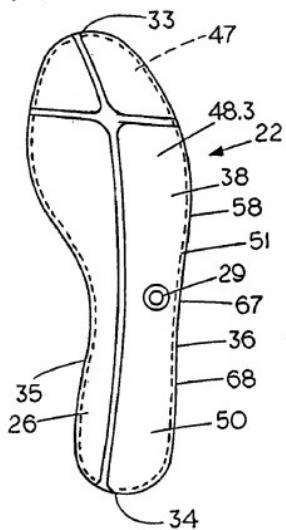


FIG. 247

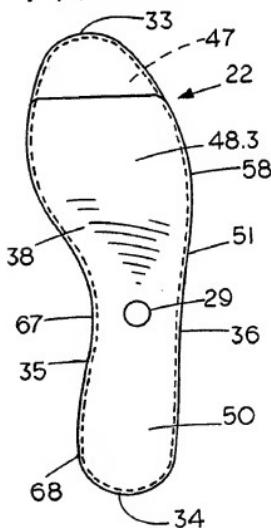


FIG. 248

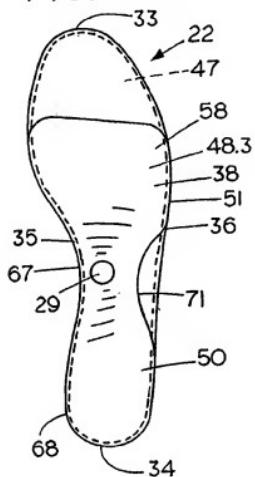


FIG. 249

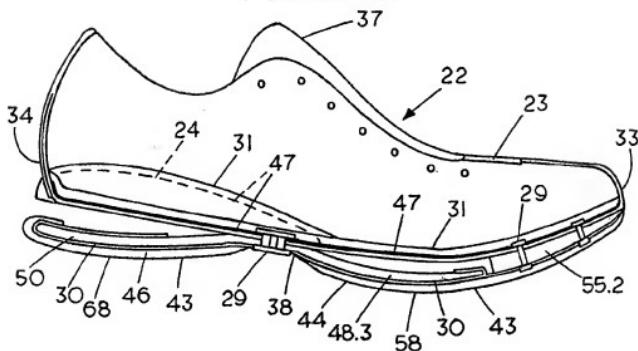


FIG. 250

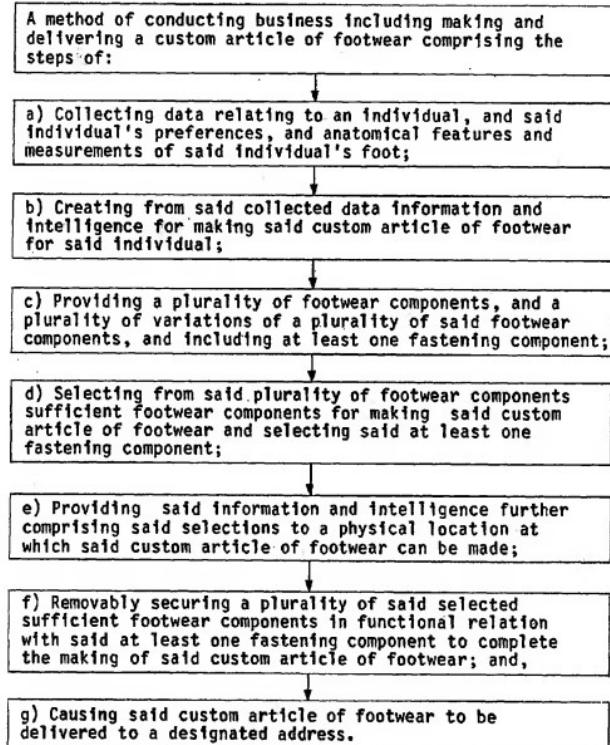


FIG. 25I

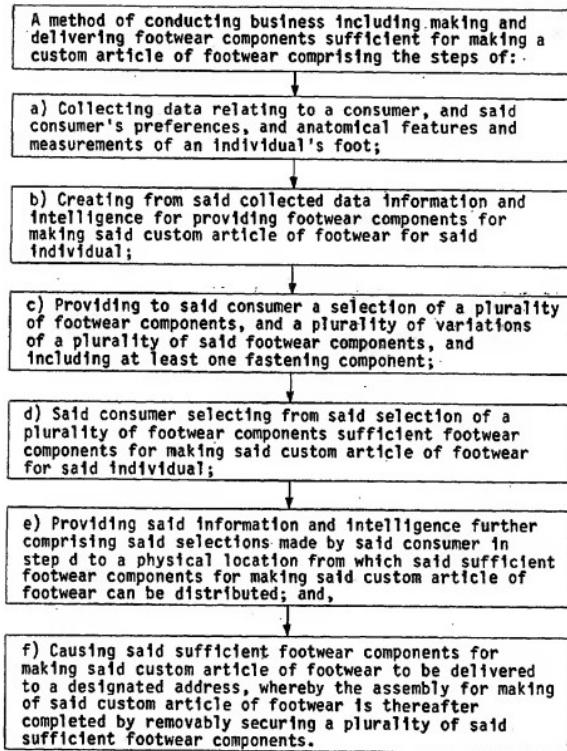


FIG. 252

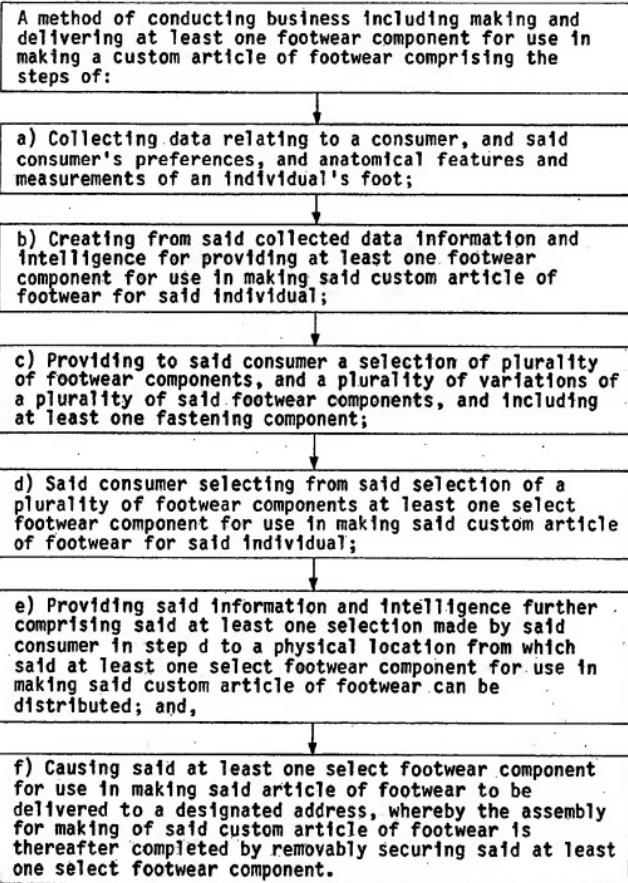


FIG. 253

A method of conducting business with the use of a vending device for making and delivering at least one footwear component for use in making a custom article of footwear comprising the steps of:

- a) Collecting data relating to a consumer, and said consumer's preferences, and anatomical features and measurements of an individual's foot;
- b) Creating from said collected data information and intelligence for providing at least one footwear component for use in making said custom article of footwear for said individual;
- c) Providing to said consumer a selection of a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, and including at least one fastening component;
- d) Said consumer selecting from said selection of a plurality of footwear components at least one select footwear component for use in making said custom article of footwear for said individual;
- e) Providing said information and intelligence further comprising said at least one selection made by said consumer in step d to a physical location from which said at least one select footwear component for use in making said custom article of footwear can be distributed; and,
- f) Causing said at least one select footwear component for use in making said custom article of footwear to be delivered to a designated address, wherein steps a-f are performed with the use of said vending device and the assembly for making of said custom article of footwear is thereafter completed by removably securing said at least one select footwear component.

FIG. 254

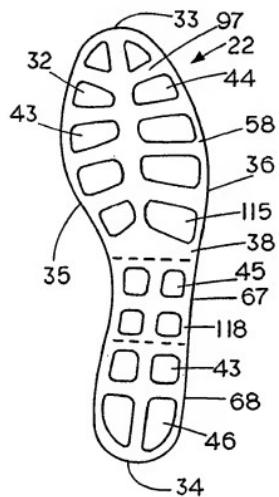


FIG. 255

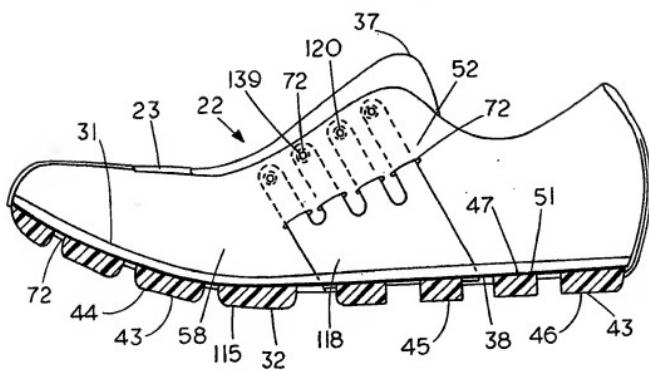


FIG. 256

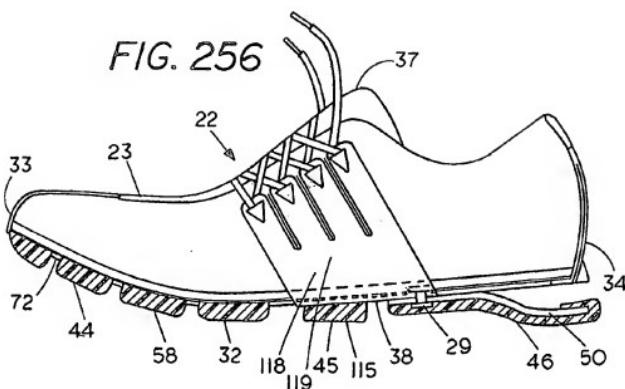


FIG. 257

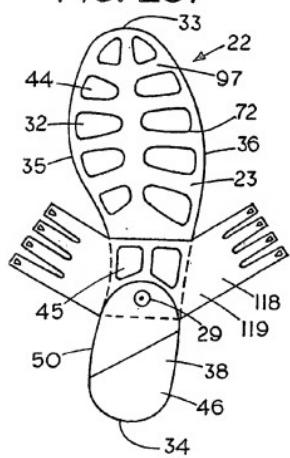
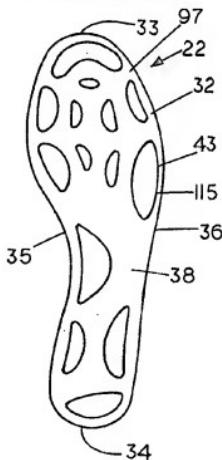


FIG. 258



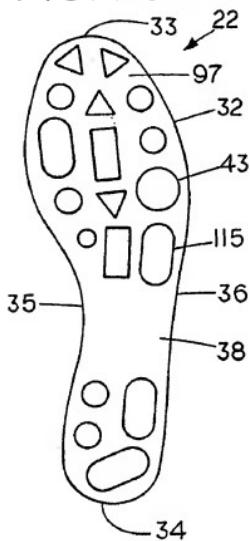
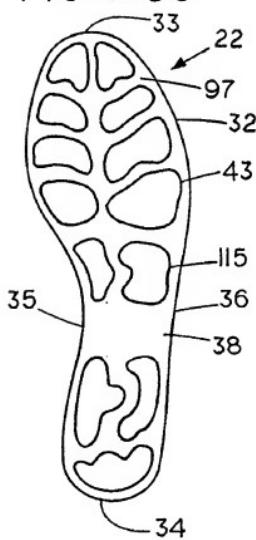
*FIG. 259**FIG. 260*

FIG. 261

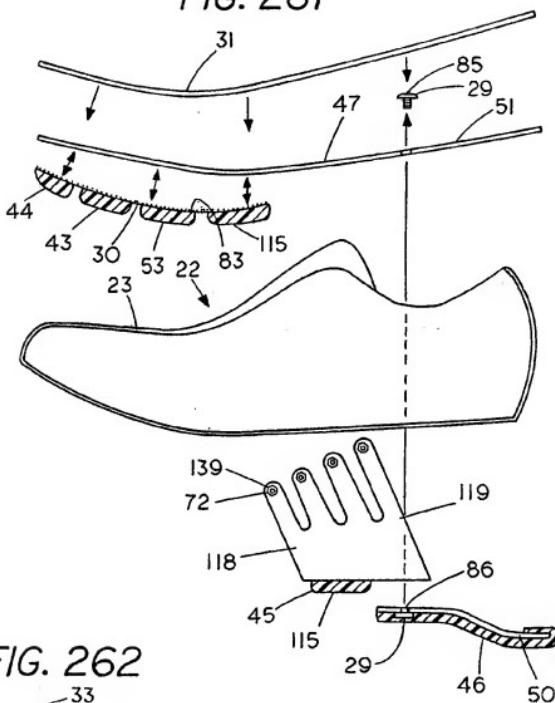
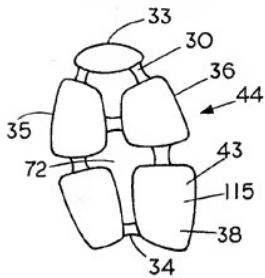
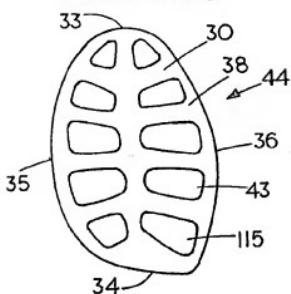
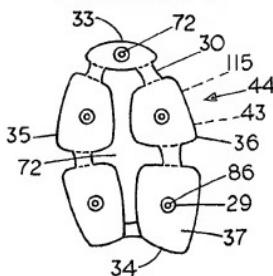
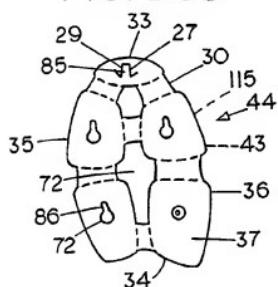
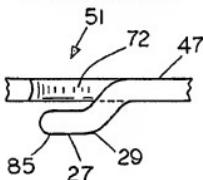
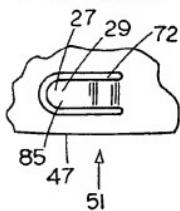
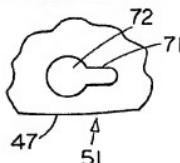
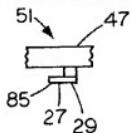
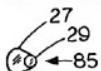
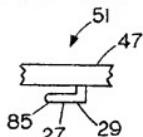
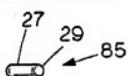
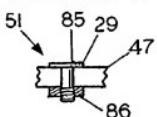
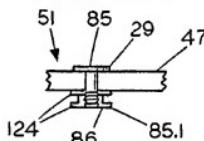
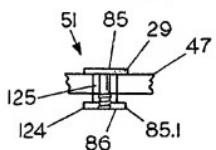
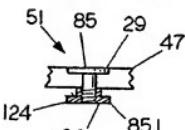
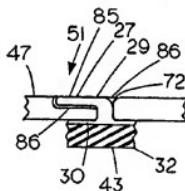
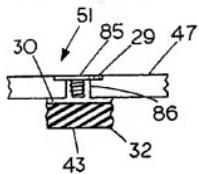
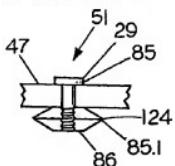
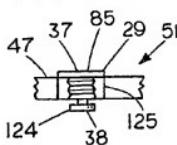


FIG. 262



**FIG. 263****FIG. 264****FIG. 265****FIG. 266****FIG. 267****FIG. 268**

**FIG. 269****FIG. 270****FIG. 271****FIG. 272****FIG. 273****FIG. 274****FIG. 275****FIG. 276****FIG. 277****FIG. 278****FIG. 279****FIG. 280**

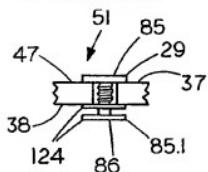
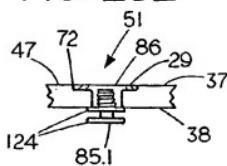
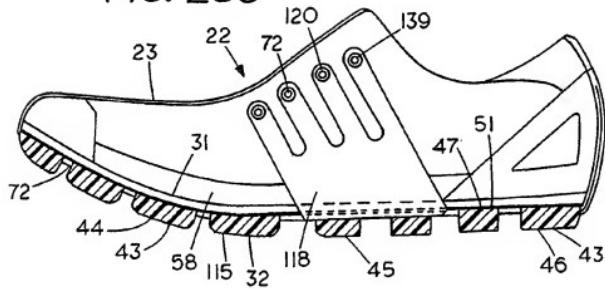
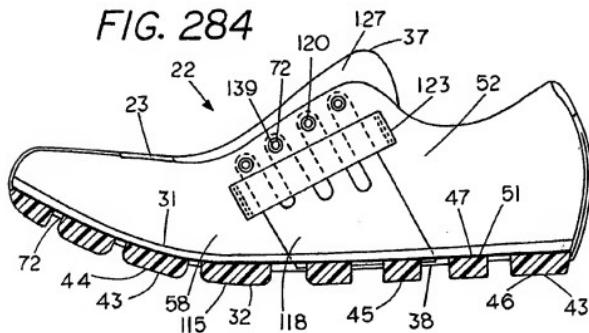
*FIG. 281**FIG. 282**FIG. 283**FIG. 284*

FIG. 285

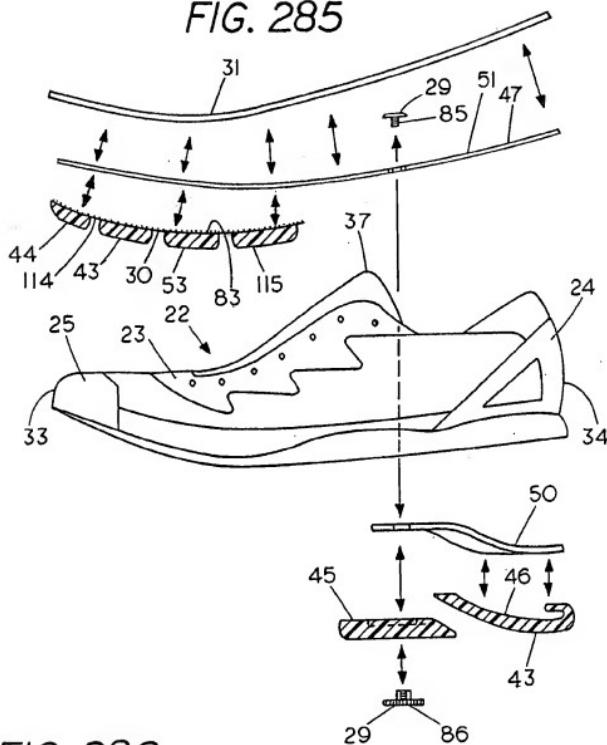


FIG. 286

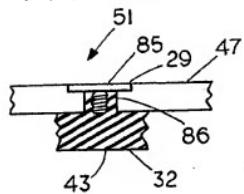


FIG. 287

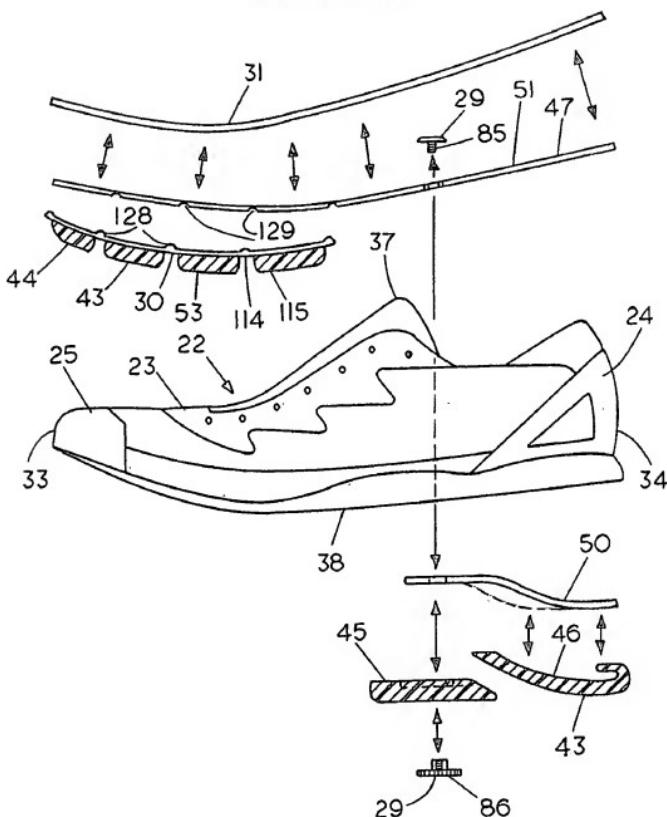


FIG. 288

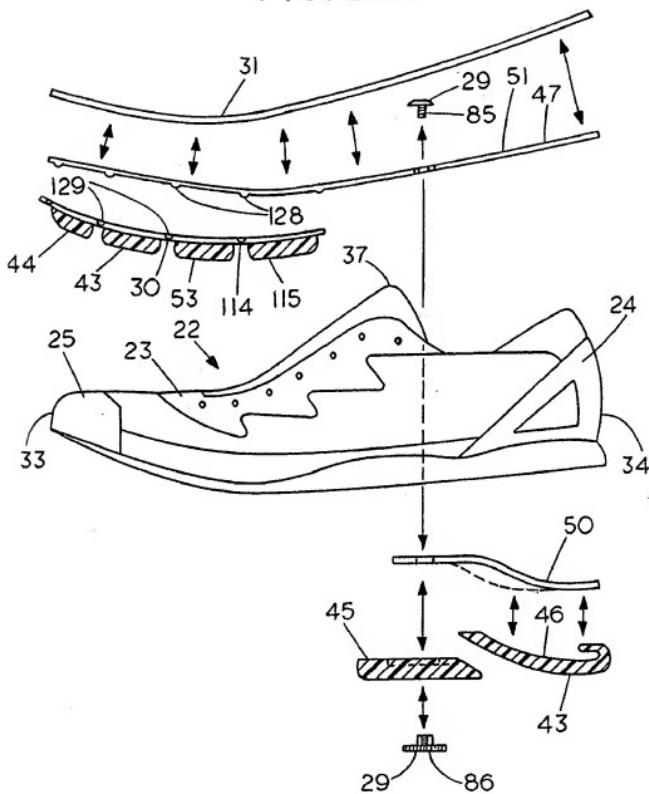


FIG. 289

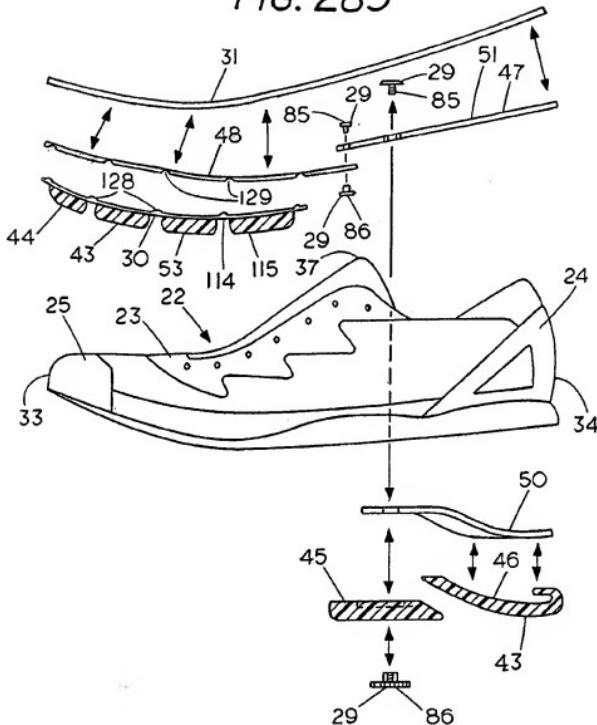


FIG. 290

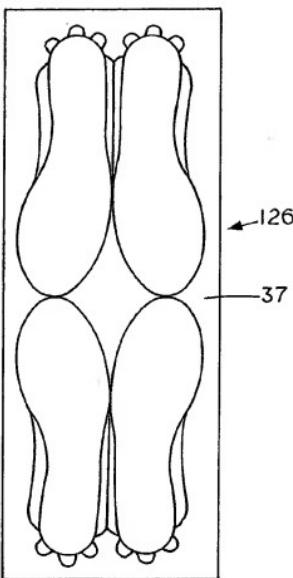
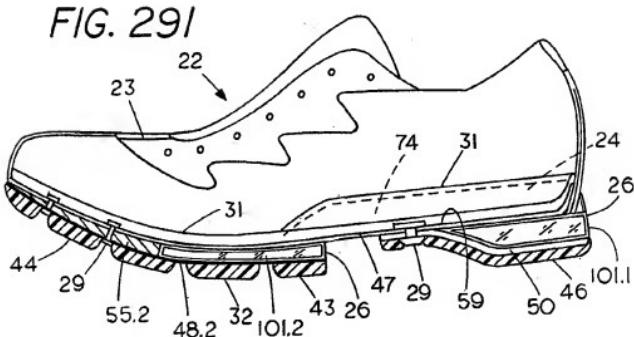
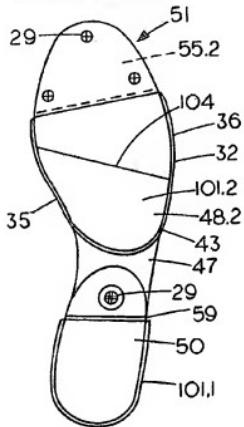
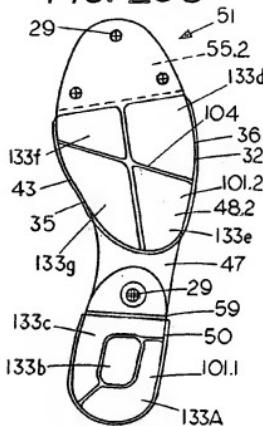
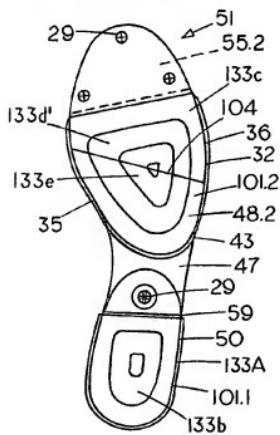
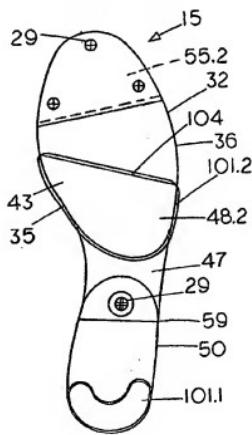
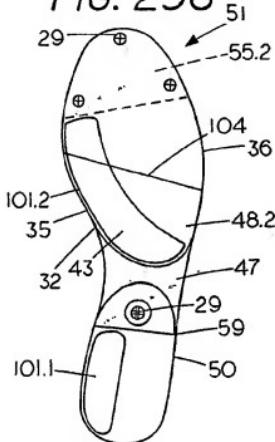
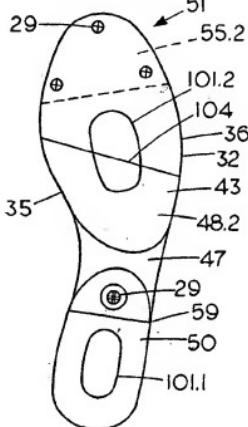
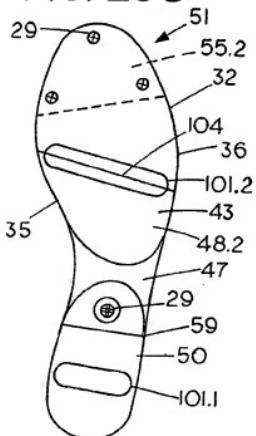
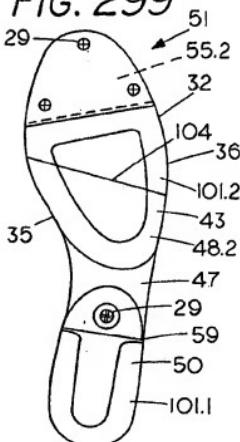


FIG. 291



**FIG. 292****FIG. 293****FIG. 294****FIG. 295**

*FIG. 296**FIG. 297**FIG. 298**FIG. 299*

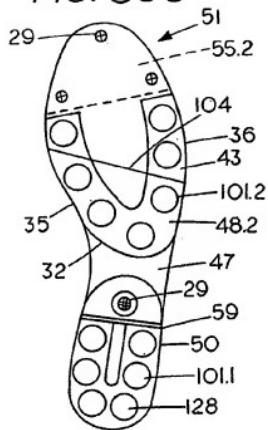
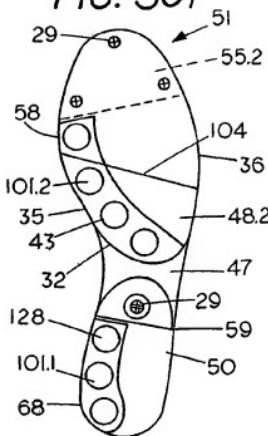
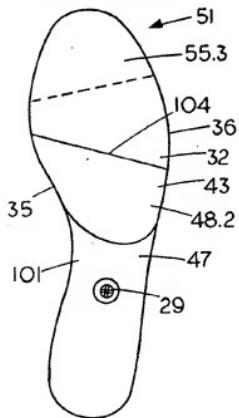
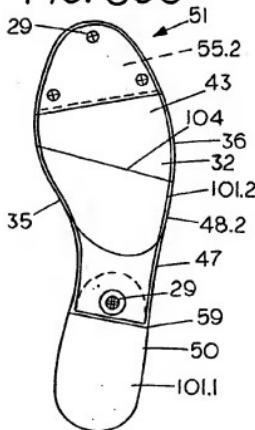
**FIG. 300****FIG. 301****FIG. 302****FIG. 303**

FIG. 304

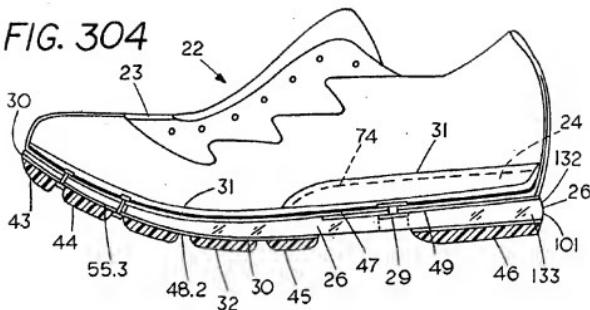


FIG. 305

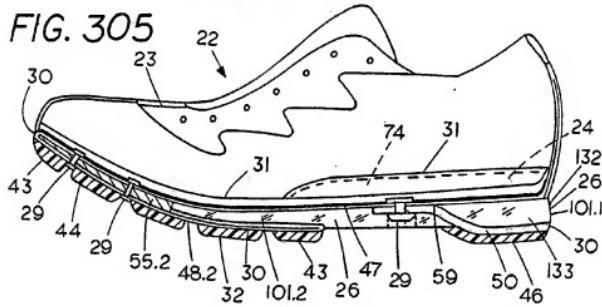


FIG. 306

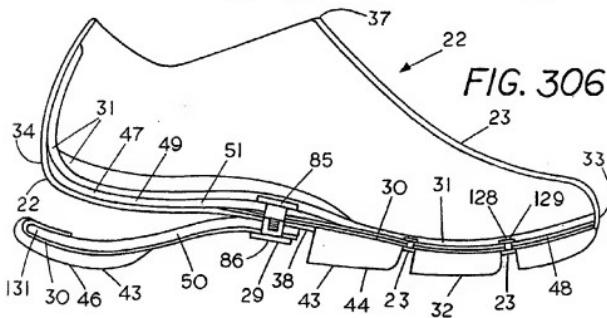
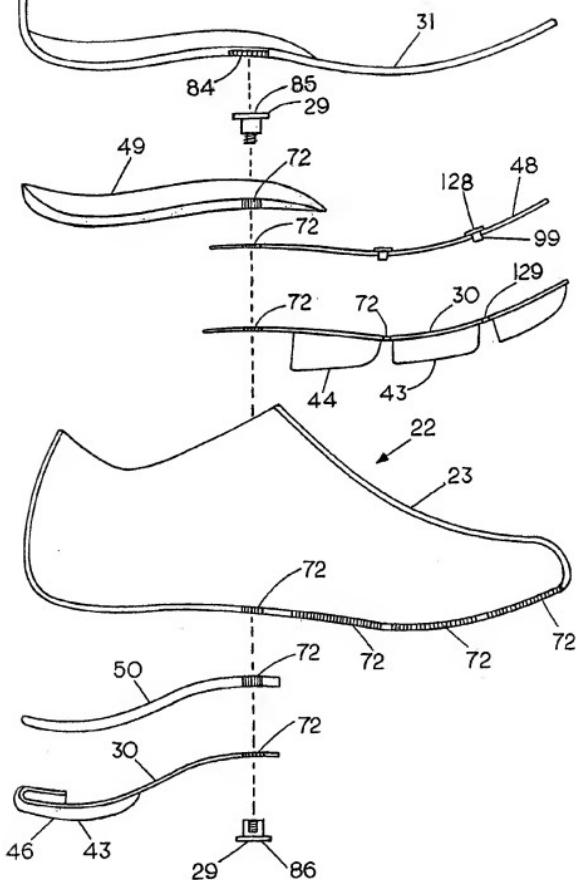
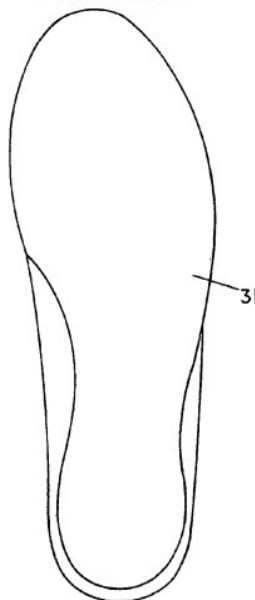
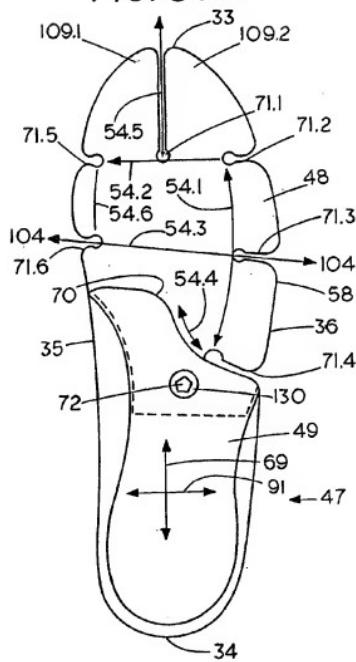
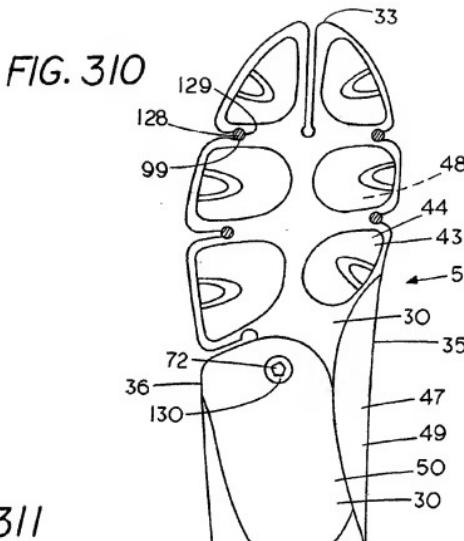


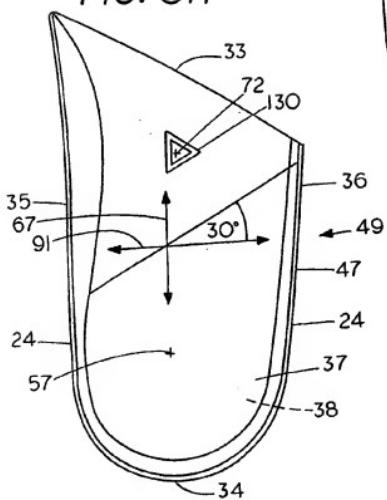
FIG. 307

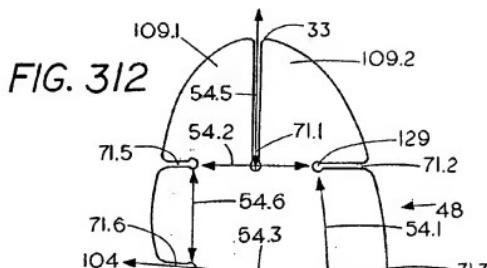


*FIG. 308**FIG. 309*

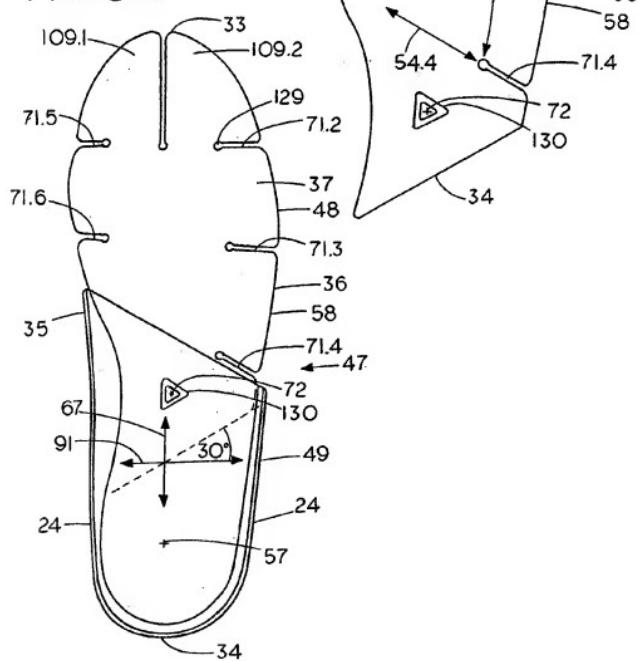


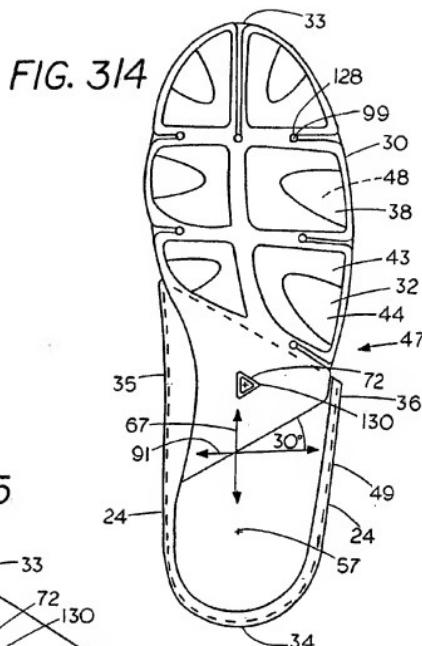
*FIG. 311*



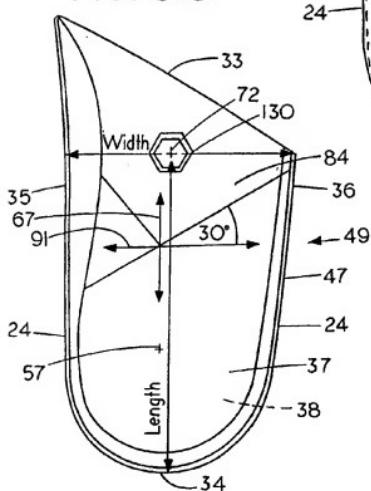


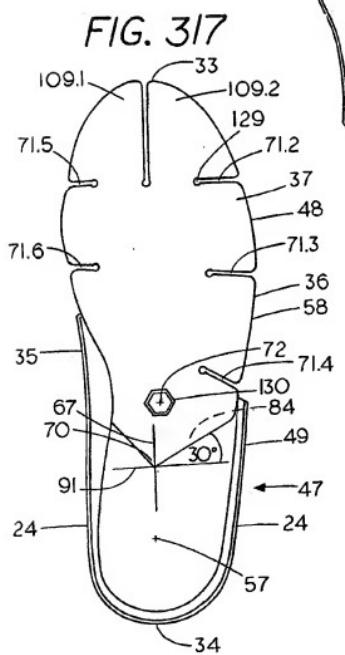
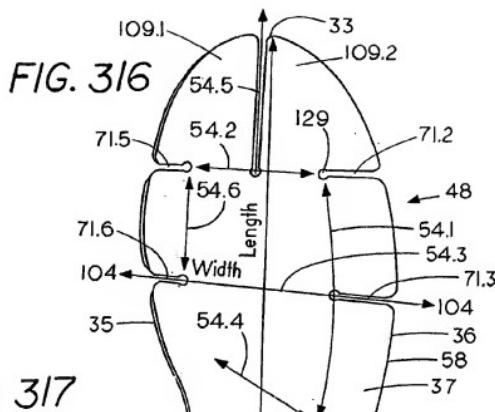
*FIG. 313*

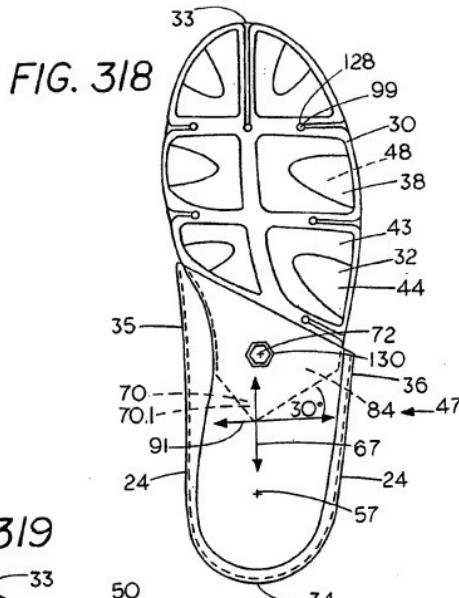




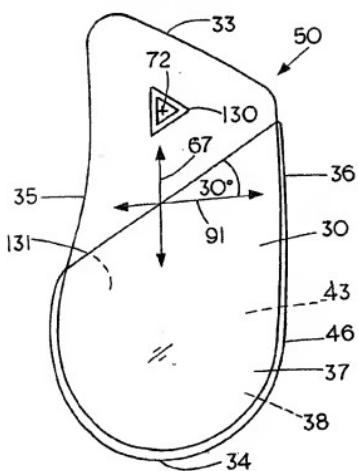
*FIG. 3/5*







*FIG. 3/9*



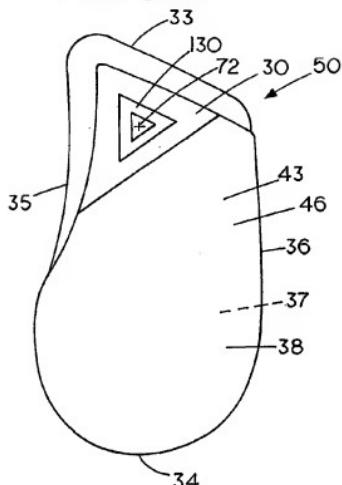
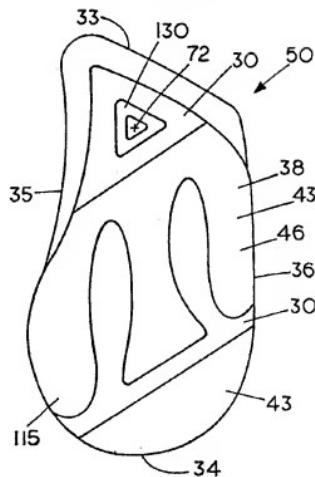
*FIG. 320**FIG. 321*

FIG. 322

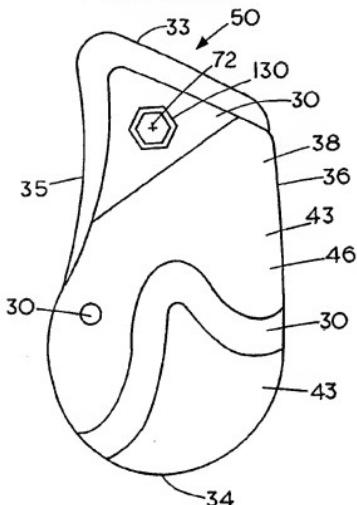
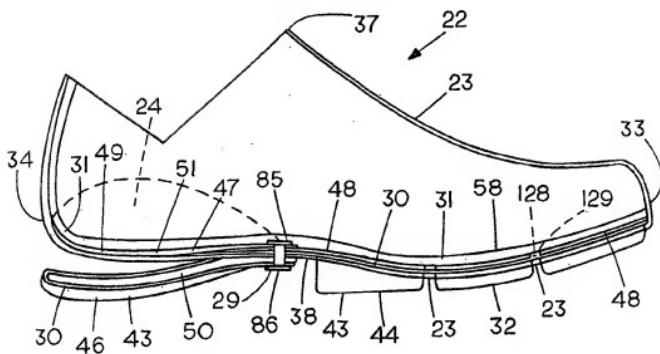
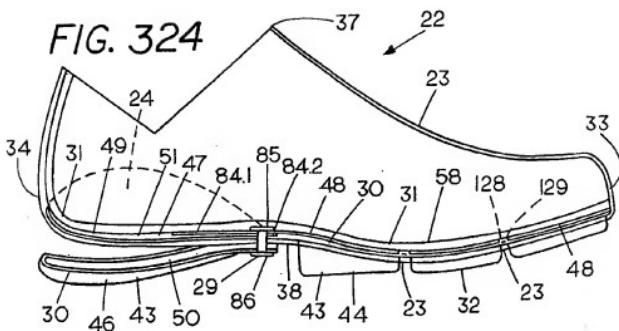
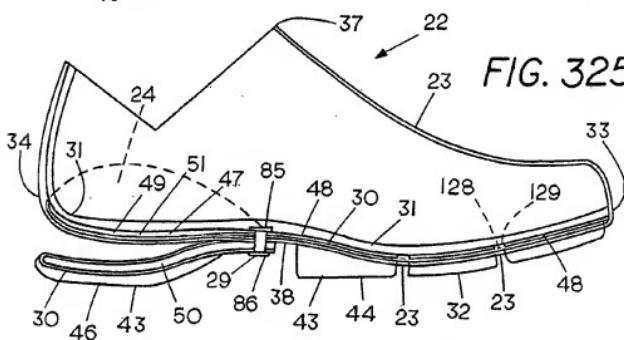
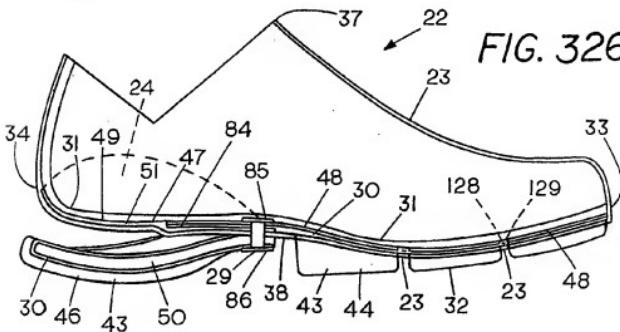


FIG. 323



**FIG. 324****FIG. 325****FIG. 326**

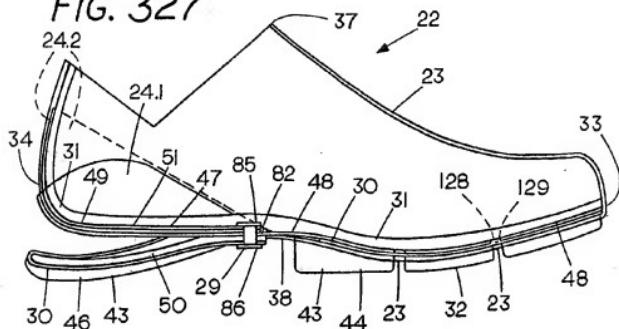
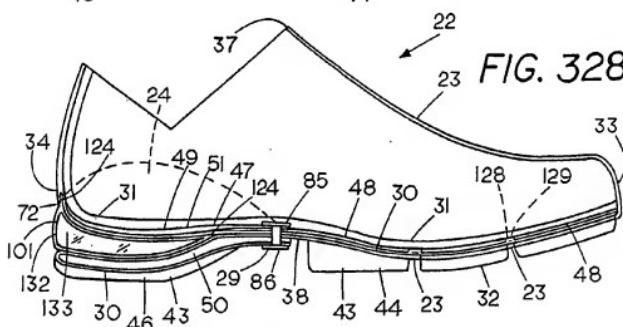
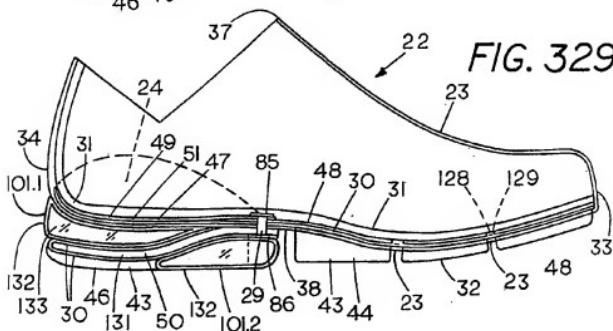
*FIG. 327**FIG. 328**FIG. 329*

FIG. 330

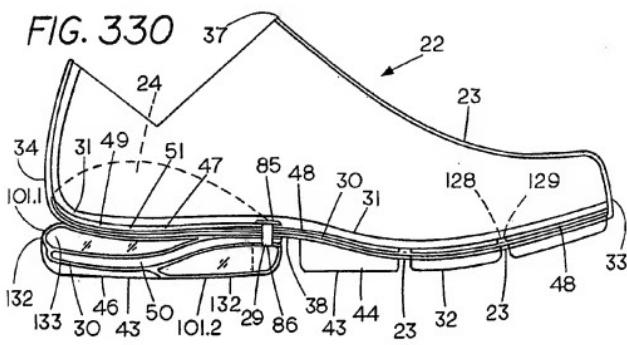


FIG. 331

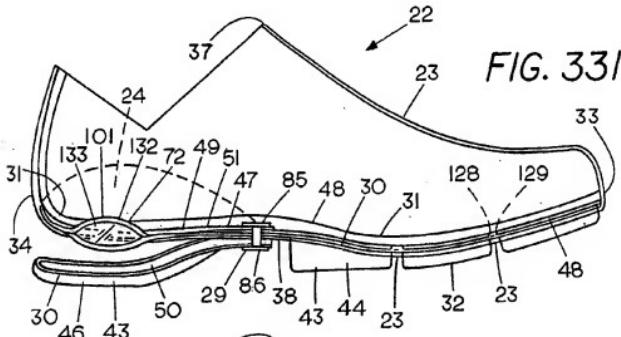


FIG. 332

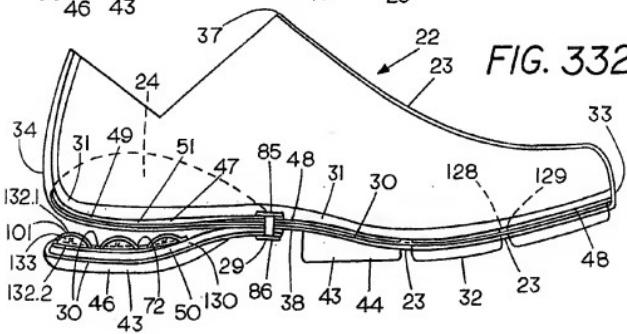


FIG. 333

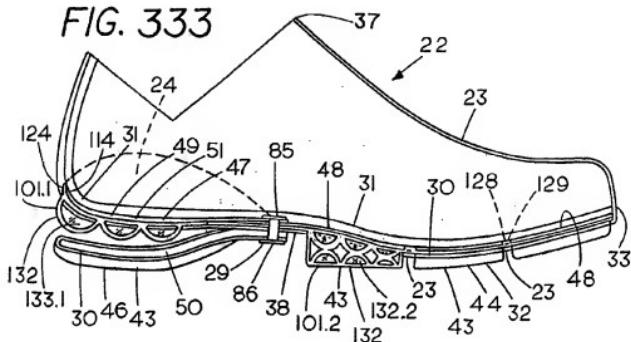


FIG. 334

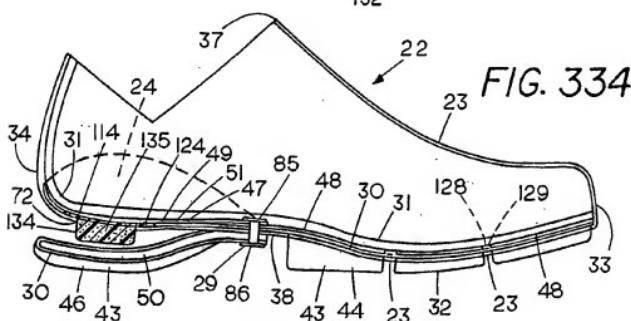
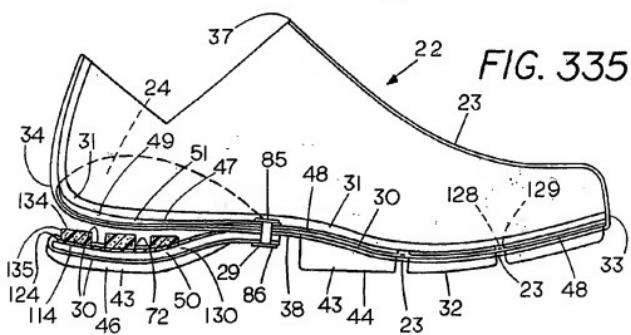
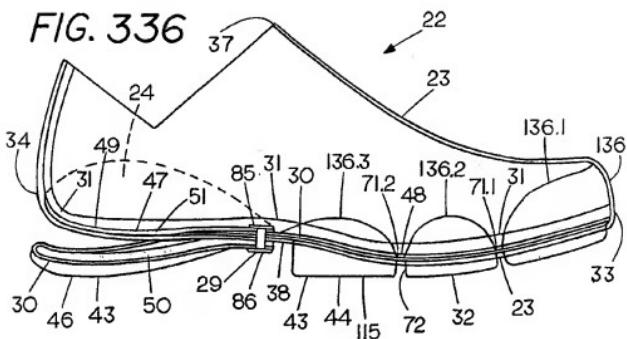
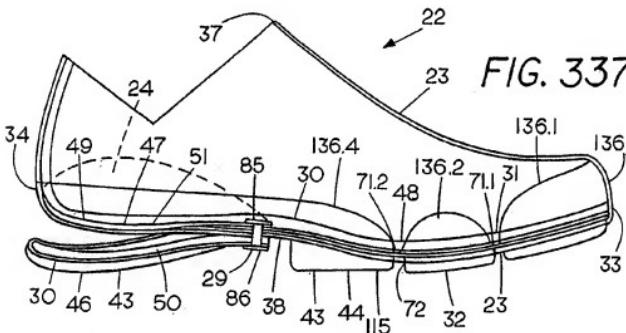
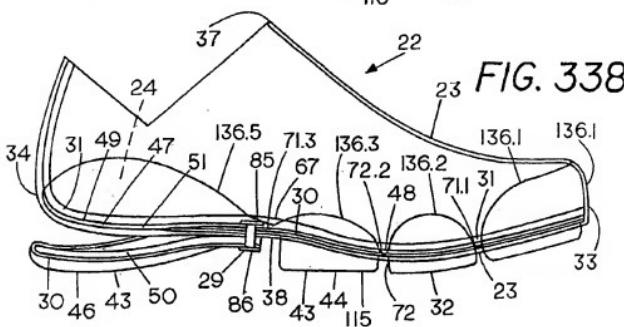


FIG. 335



*FIG. 336**FIG. 337**FIG. 338*

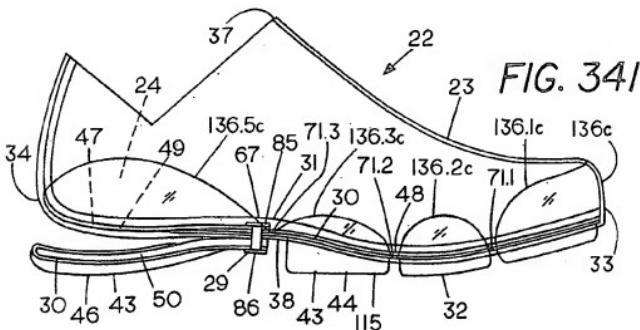
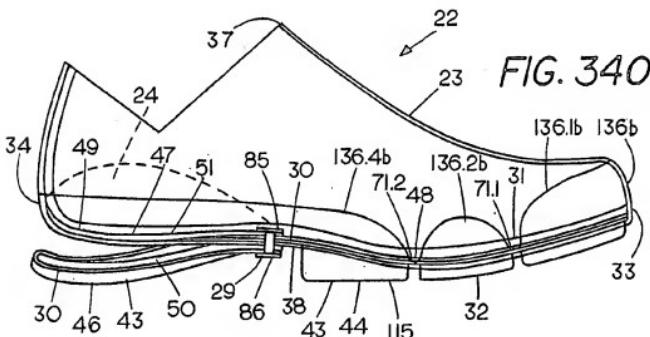
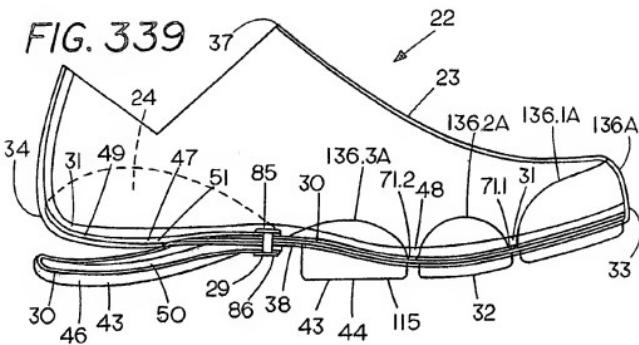


FIG. 342

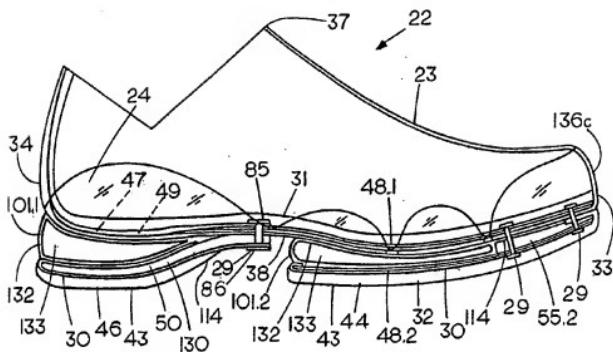


FIG. 343

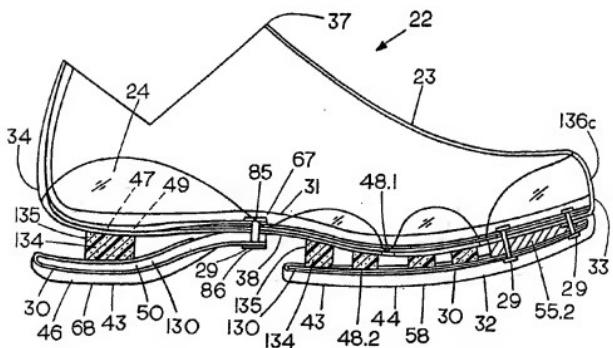


FIG. 344

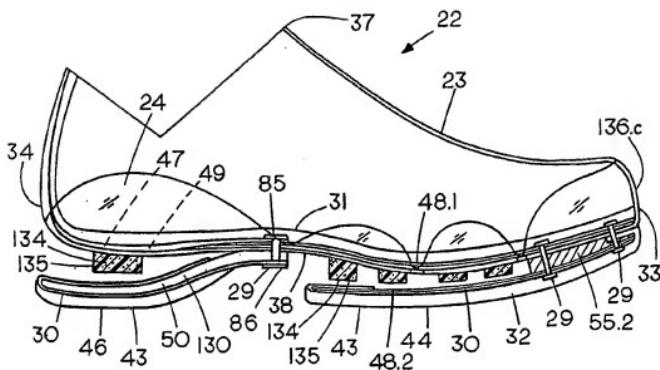


FIG. 345

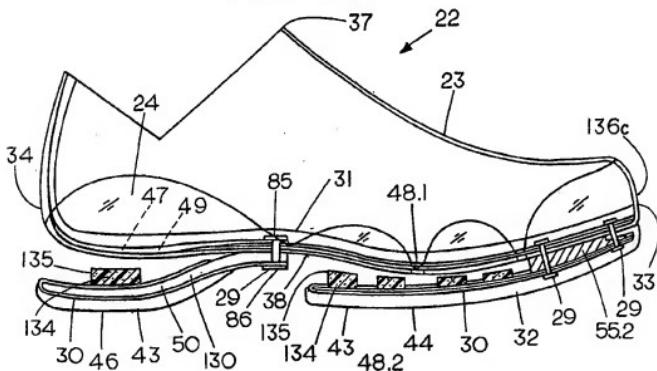


FIG. 346

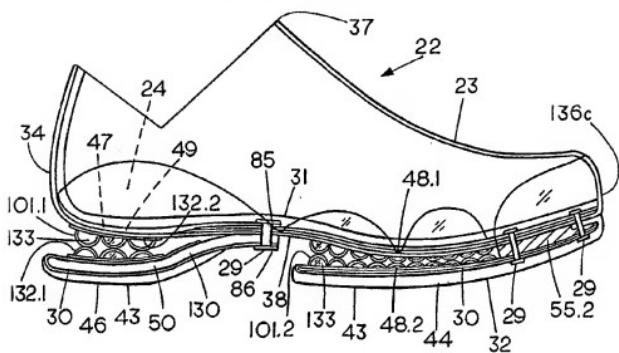
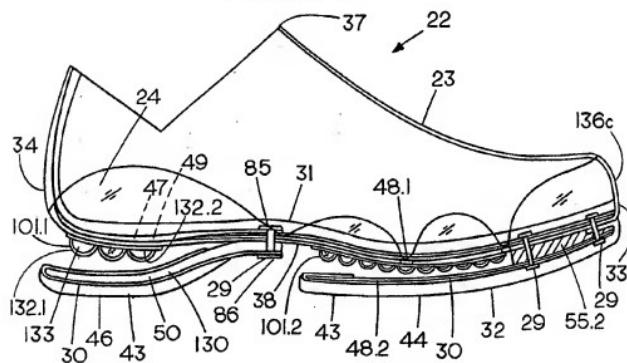


FIG. 347



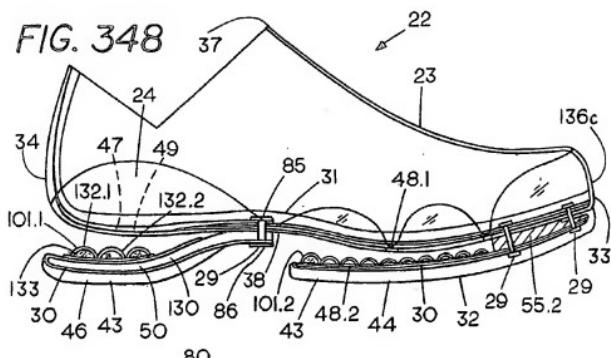
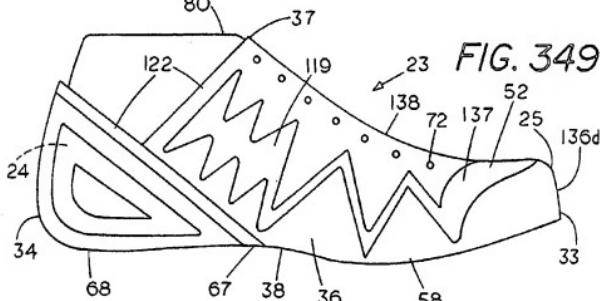
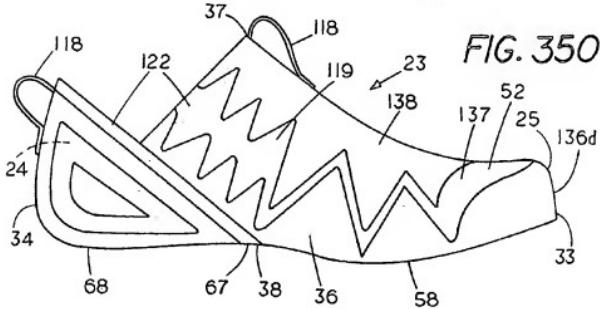
*FIG. 348**FIG. 349**FIG. 350*

FIG. 351

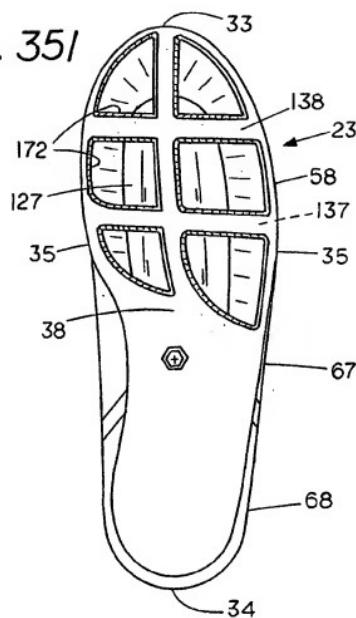


FIG. 352

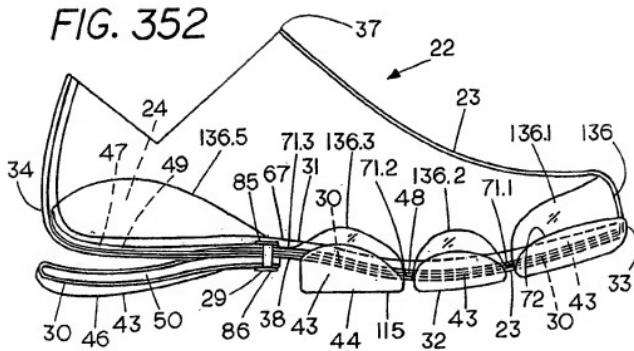


FIG. 353

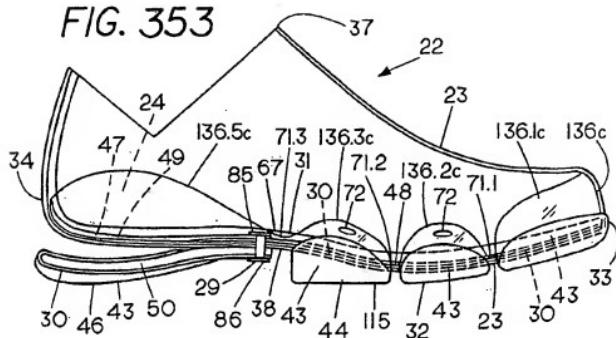
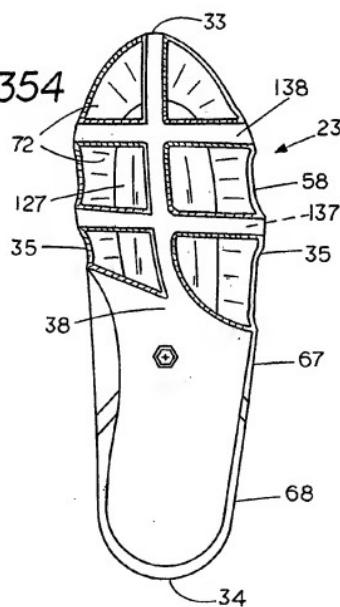


FIG. 354



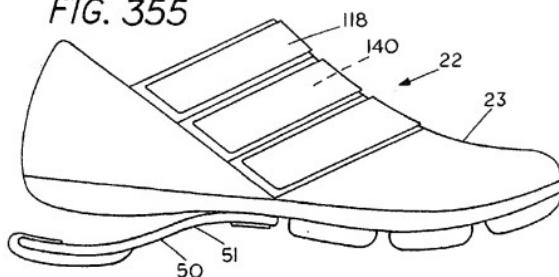
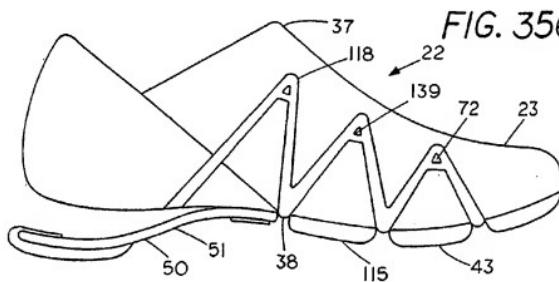
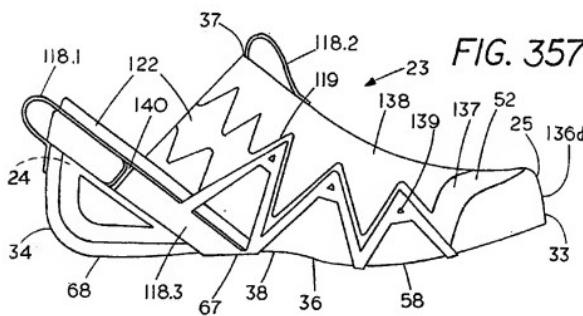
*FIG. 355**FIG. 356**FIG. 357*

FIG. 359

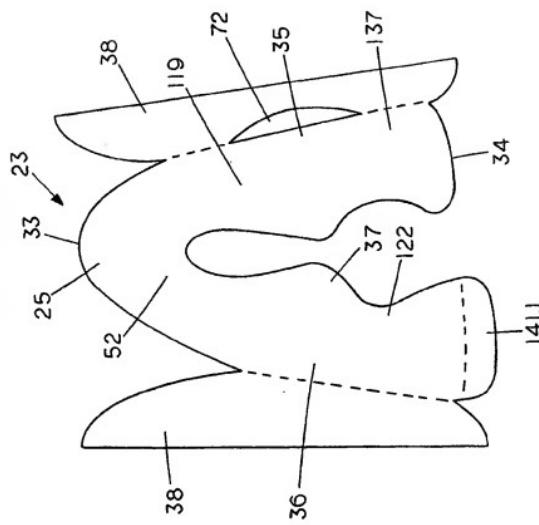
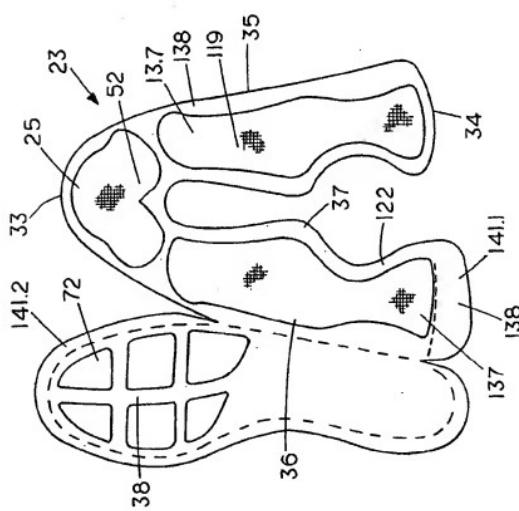


FIG. 358



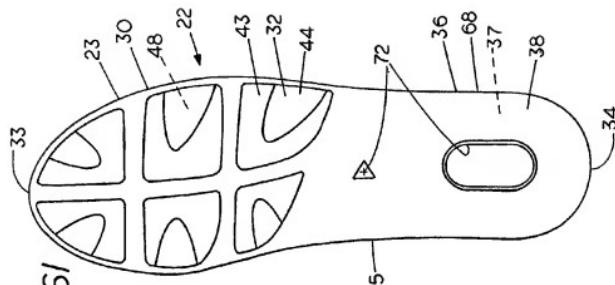


FIG. 36I

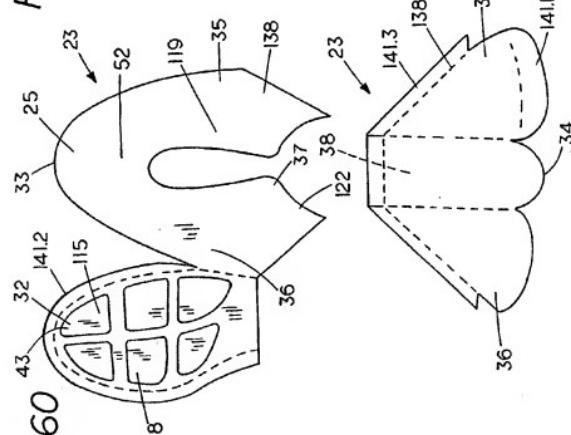
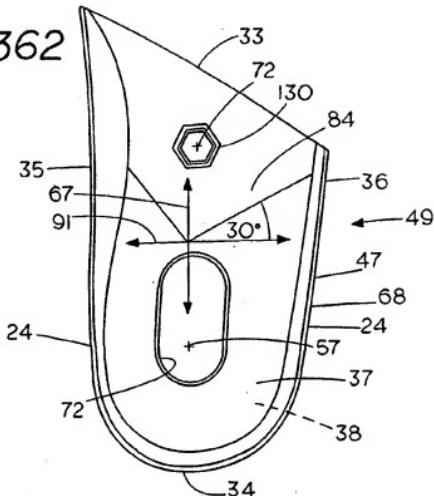
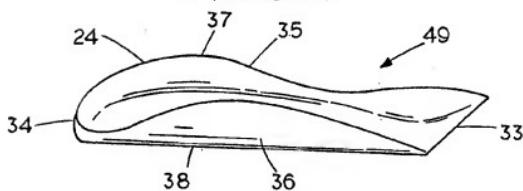
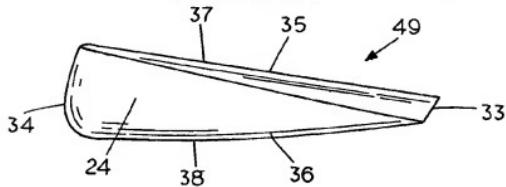
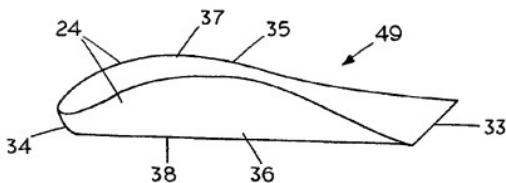
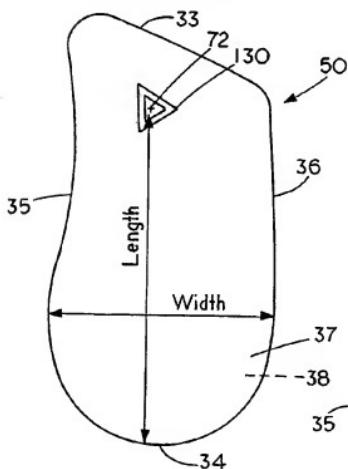
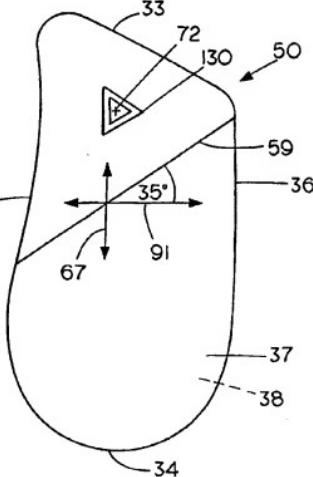
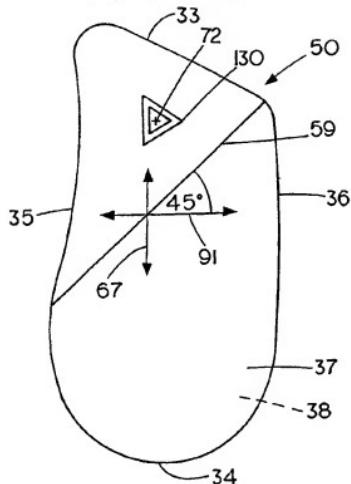
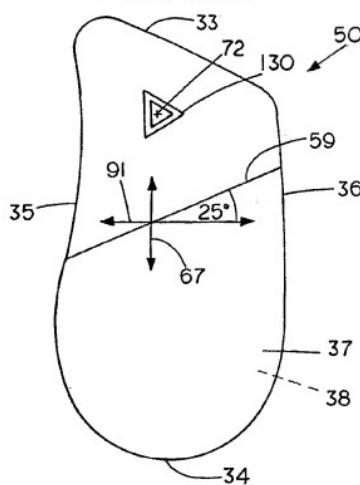
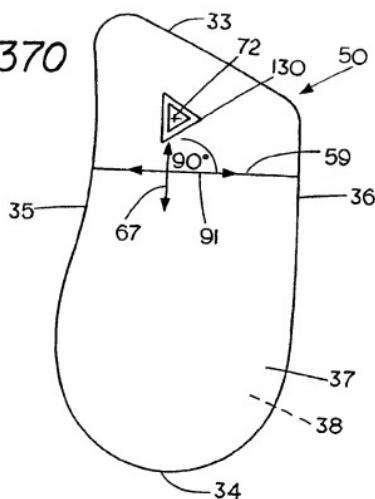
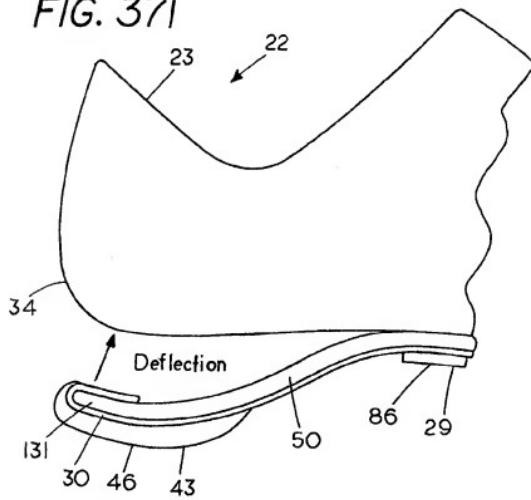


FIG. 360

*FIG. 362**FIG. 363**FIG. 364*

*FIG. 365**FIG. 366**FIG. 367*

*FIG. 368**FIG. 369*

*FIG. 370**FIG. 371*

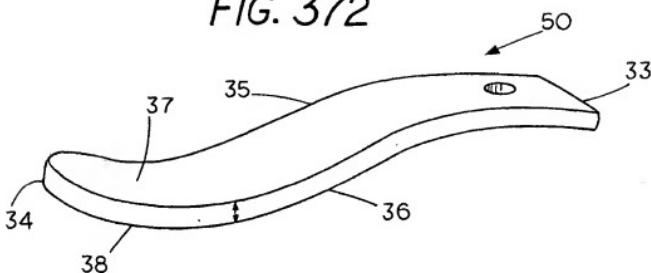
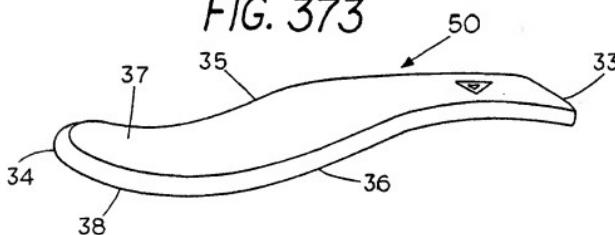
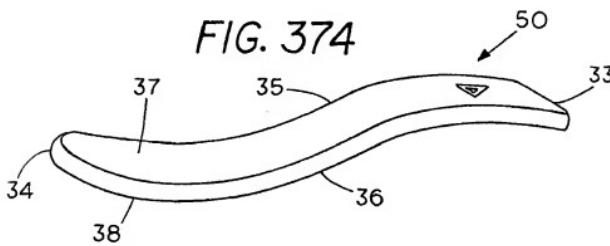
*FIG. 372**FIG. 373**FIG. 374*

FIG. 375

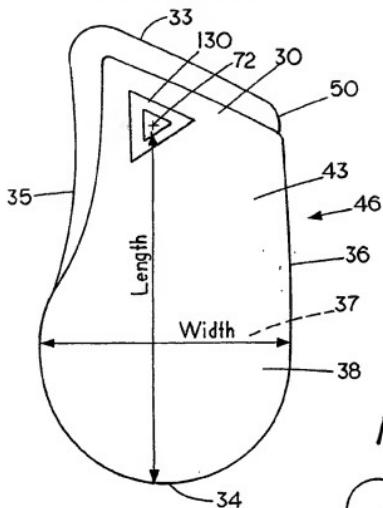
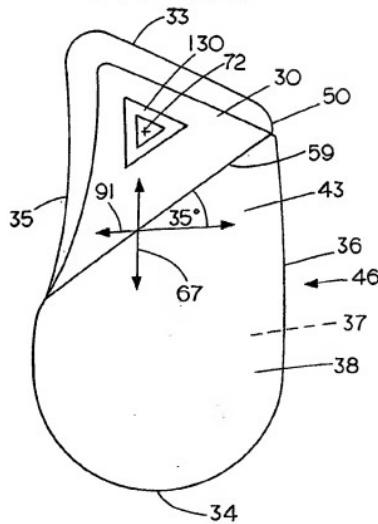
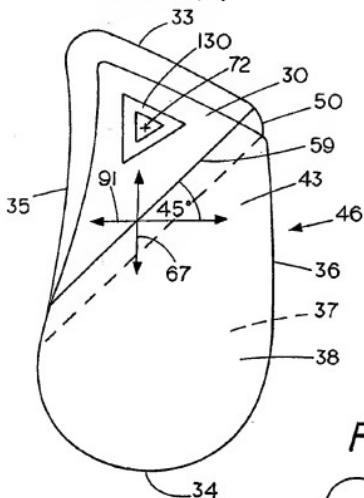
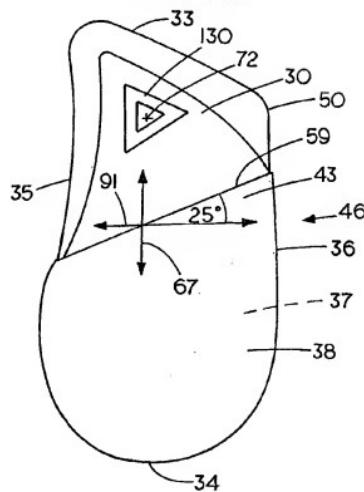
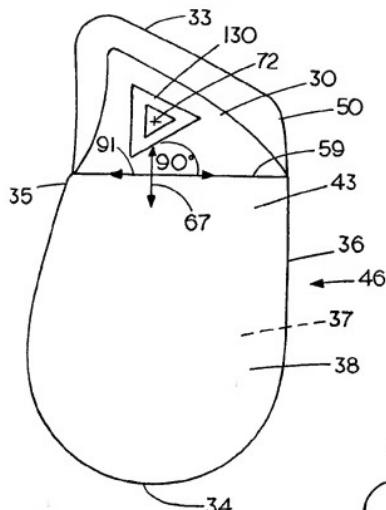
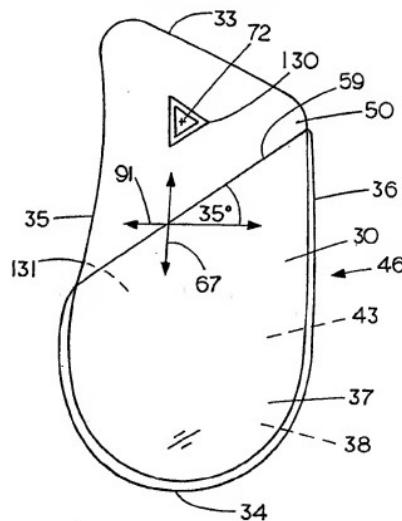


FIG. 376



*FIG. 377**FIG. 378*

*FIG. 379**FIG. 380*

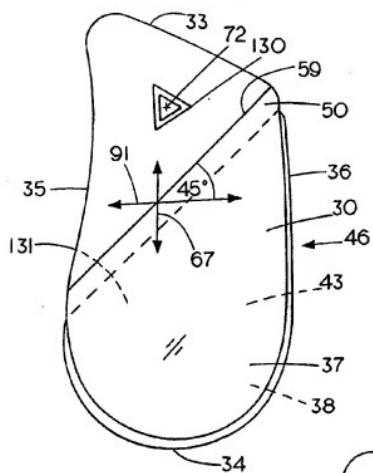
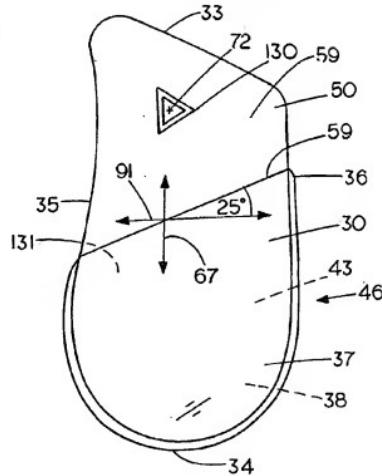
*FIG. 381**FIG. 382*

FIG. 383

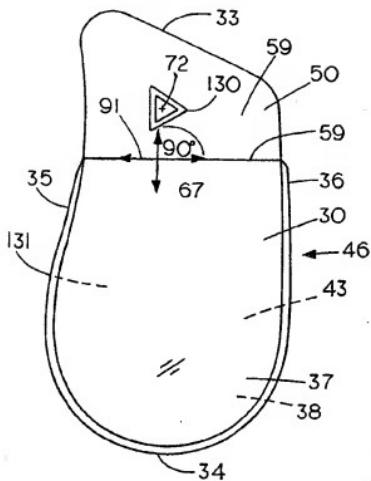


FIG. 384

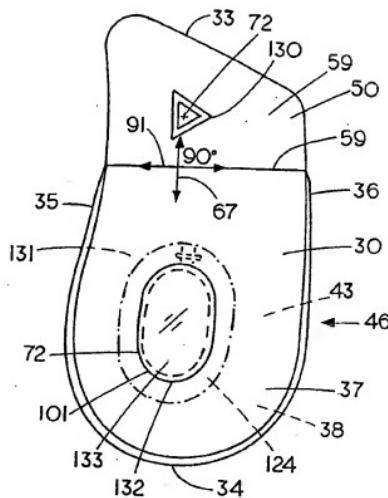


FIG. 385

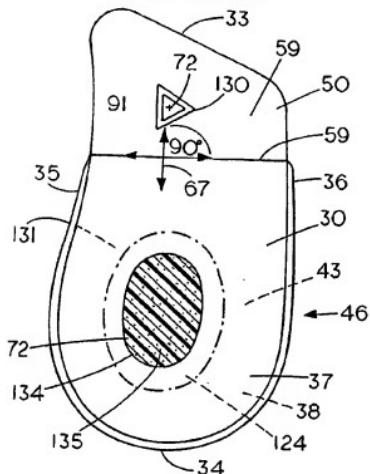
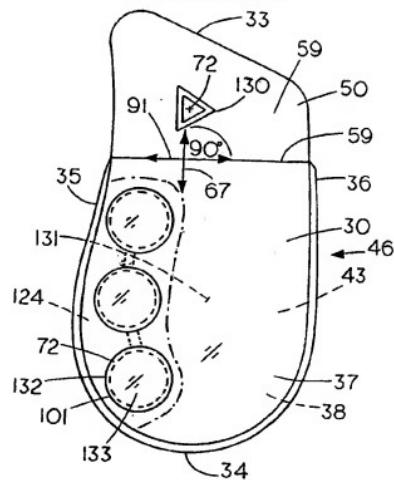
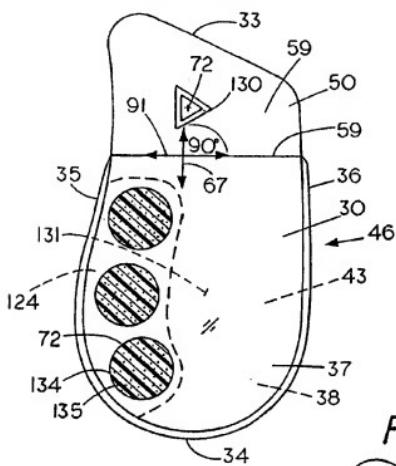
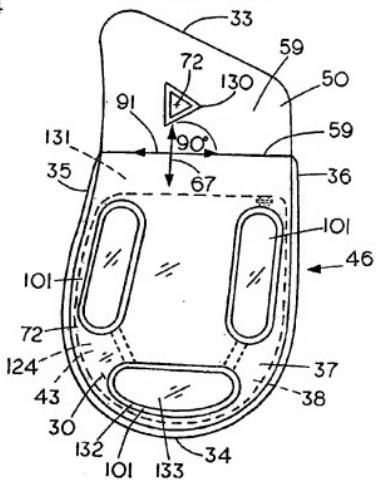
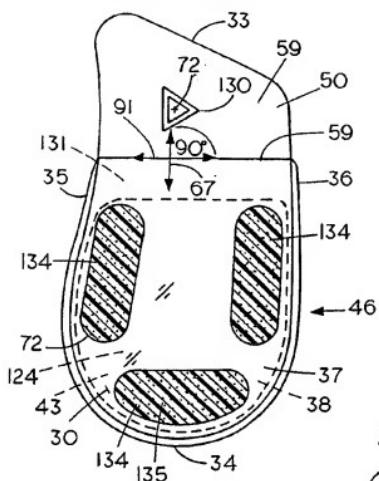
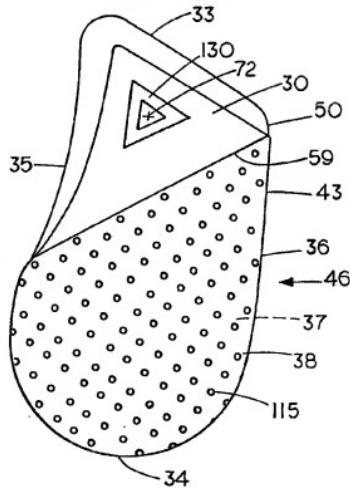


FIG. 386



*FIG. 387**FIG. 388*

*FIG. 389**FIG. 390*

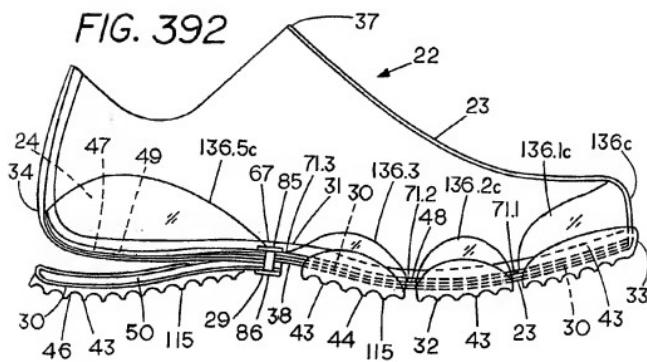
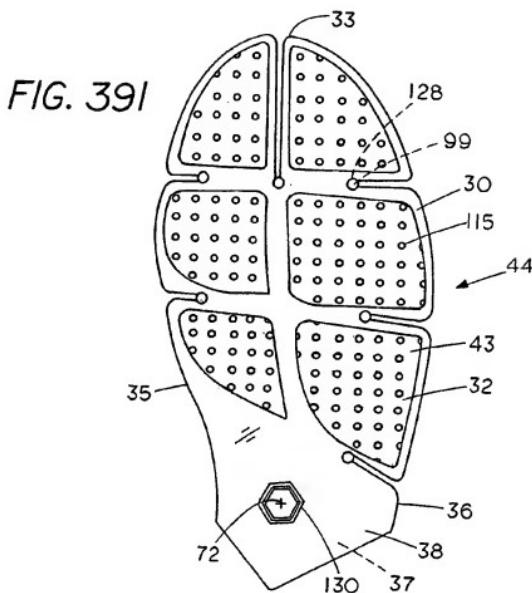


FIG. 393

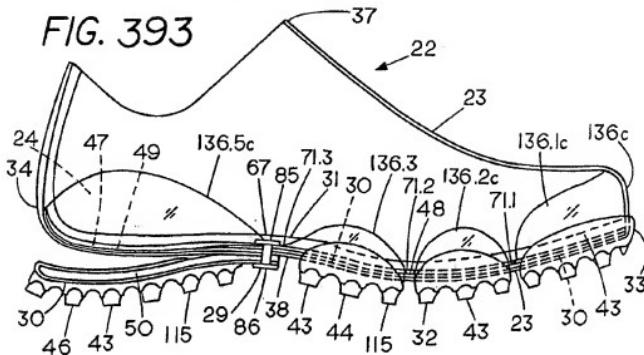
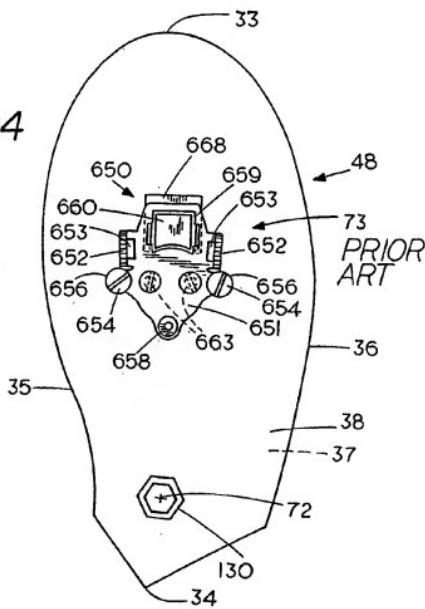


FIG. 394



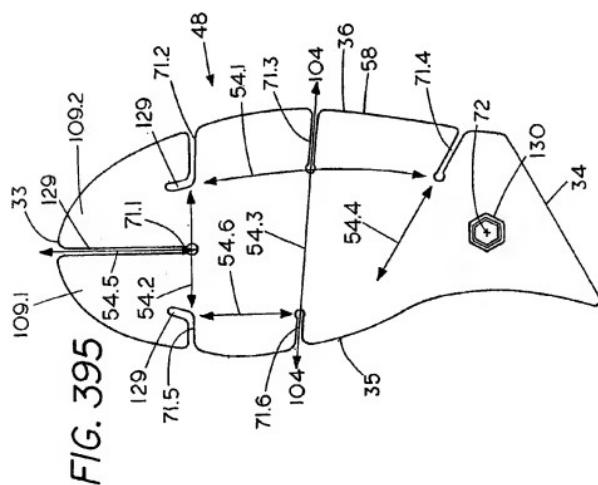
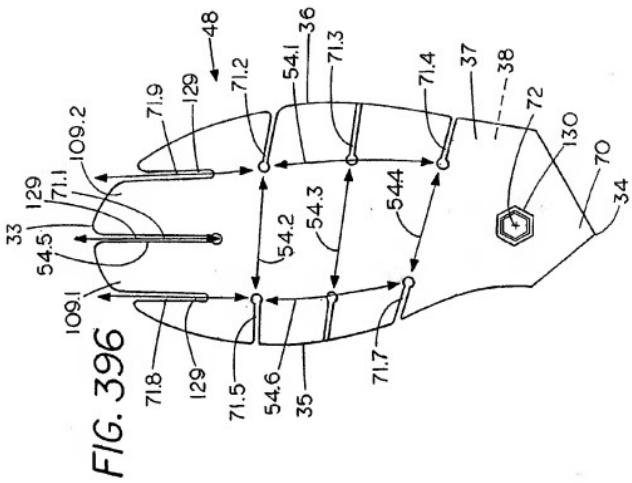


FIG. 397

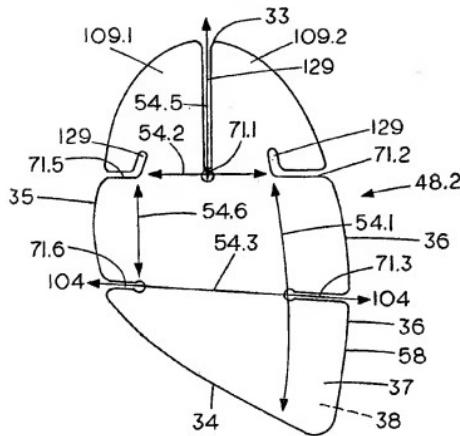
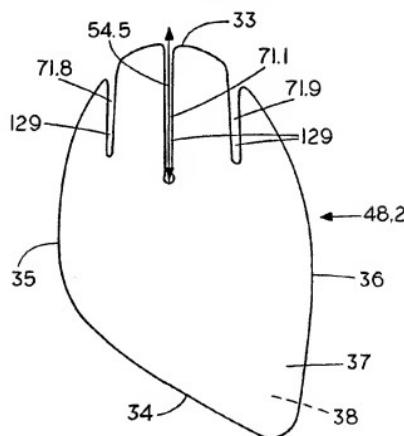
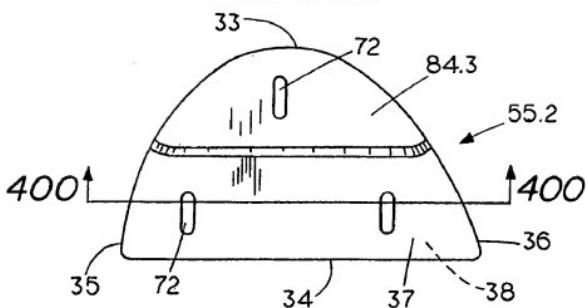
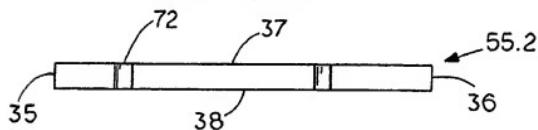
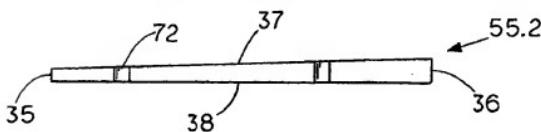


FIG. 398



*FIG. 399**FIG. 400**FIG. 401*

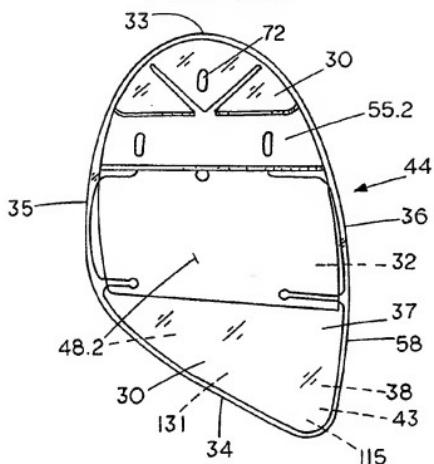
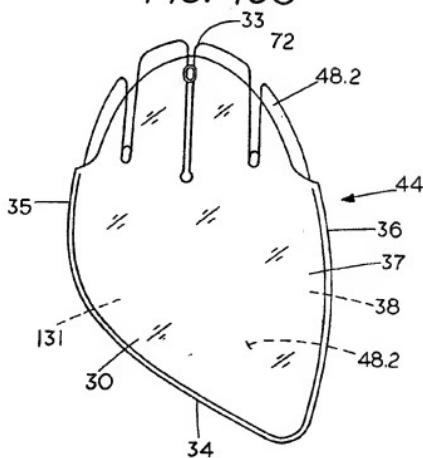
*FIG. 402**FIG. 403*

FIG. 404

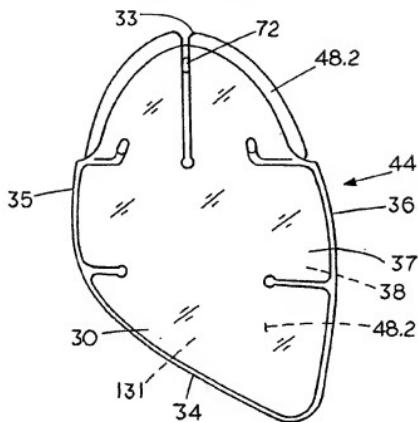


FIG. 405

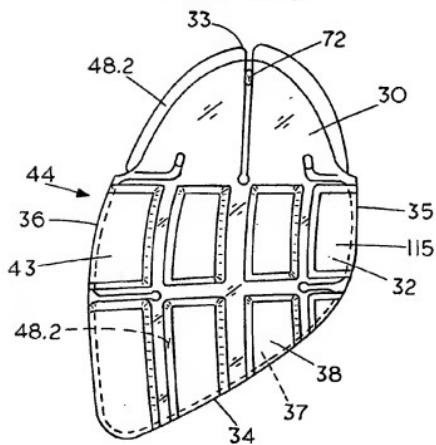


FIG. 406

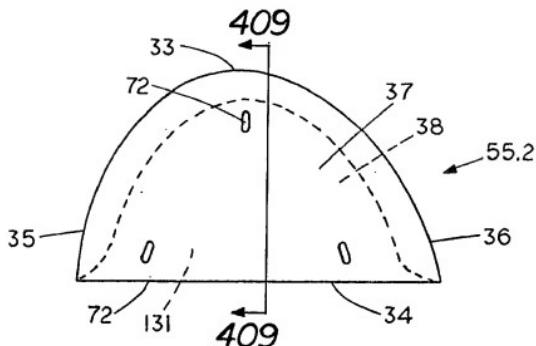


FIG. 407

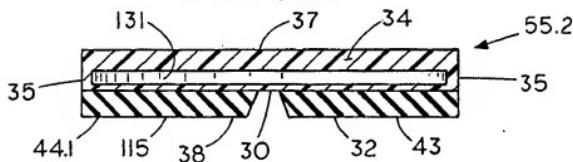


FIG. 408

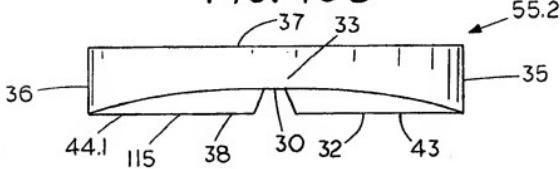


FIG. 409

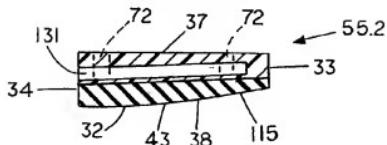


FIG. 410

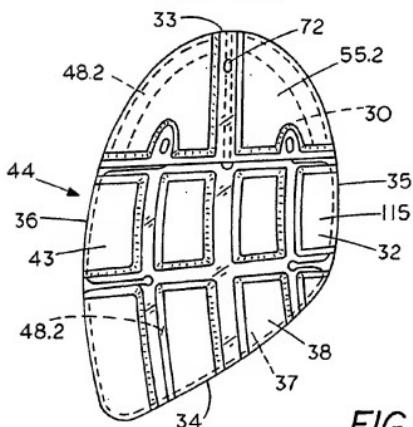


FIG. 411

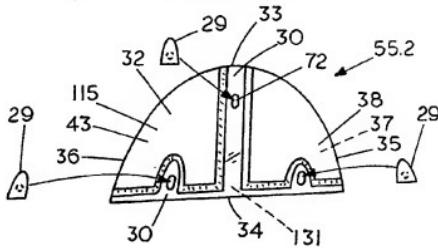


FIG. 412

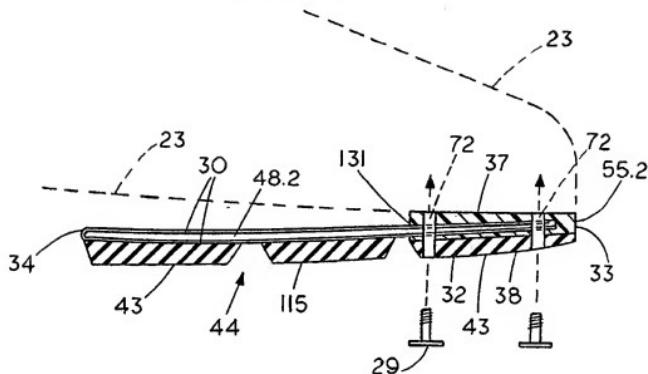


FIG. 413

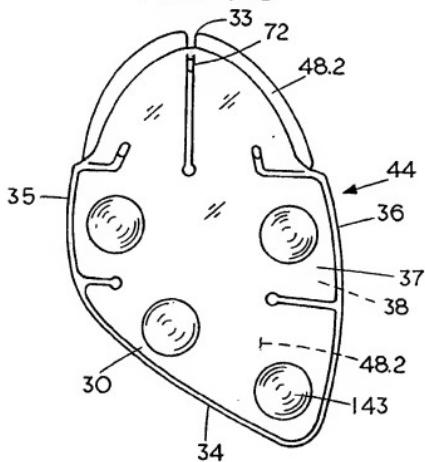


FIG. 4/4

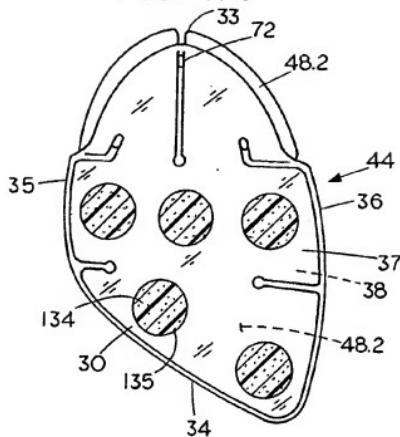


FIG. 4/5

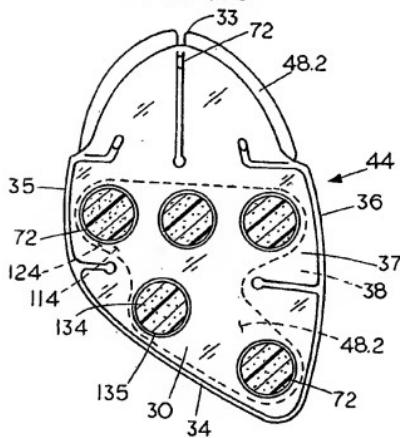


FIG. 4/6

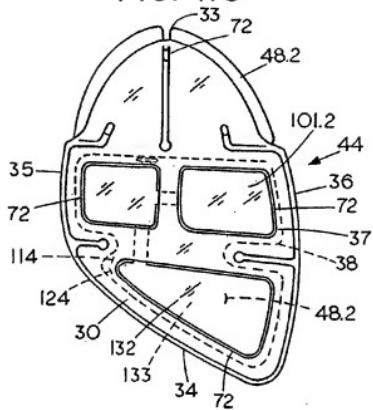
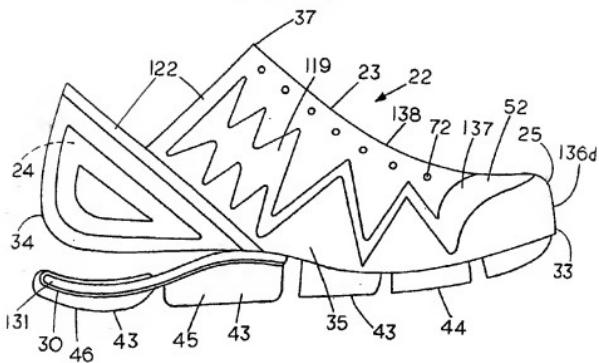
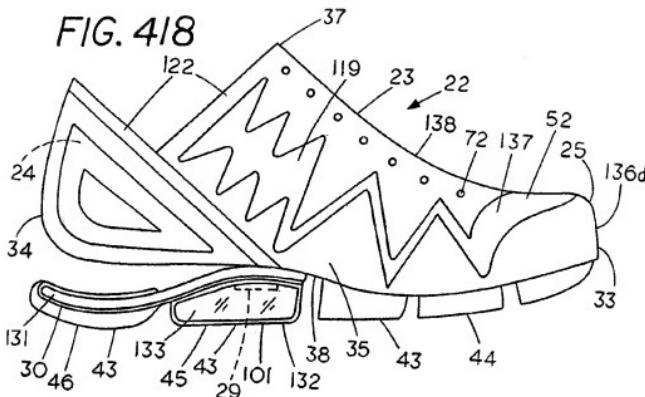
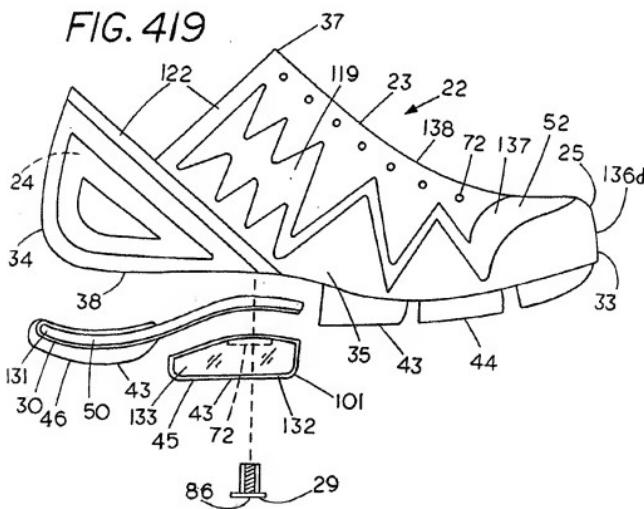


FIG. 4/7



*FIG. 418**FIG. 419*

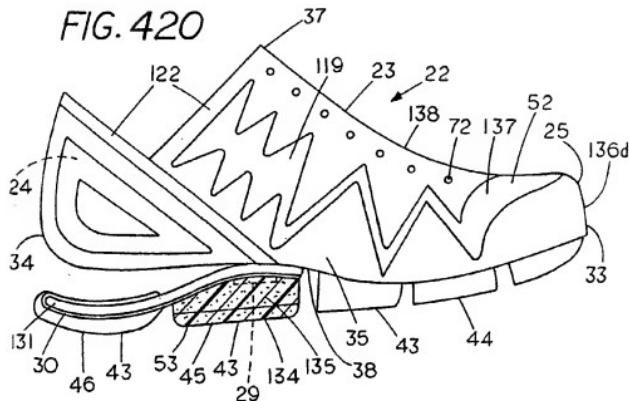
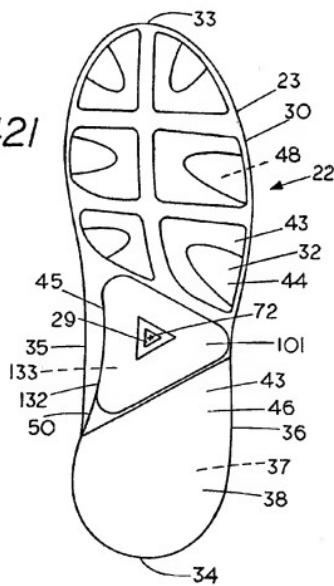
*FIG. 420**FIG. 421*

FIG. 422

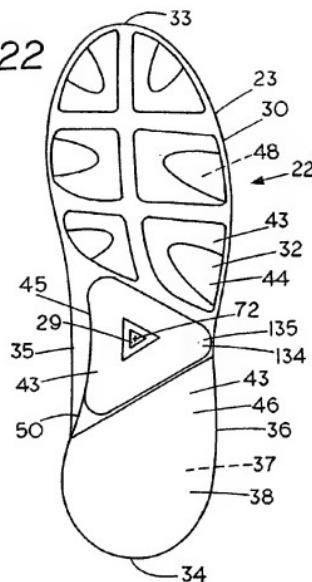


FIG. 423

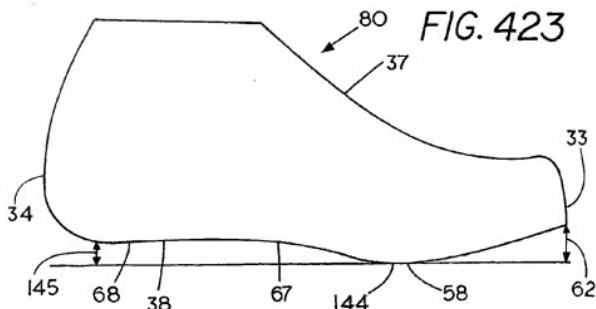


FIG. 424

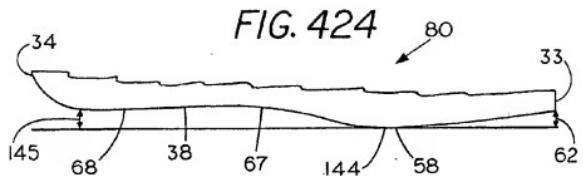


FIG. 425

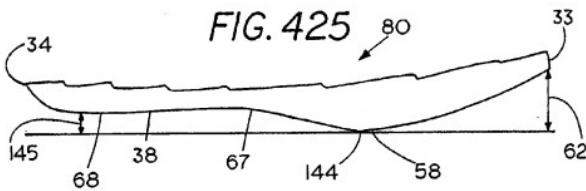
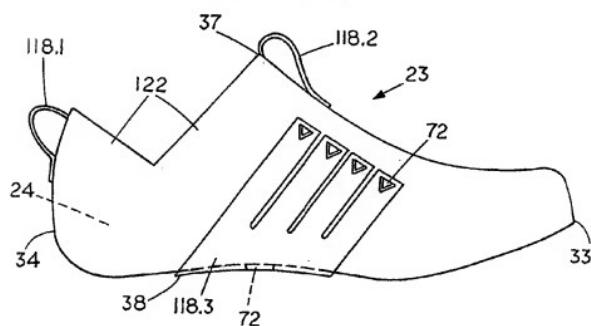


FIG. 426



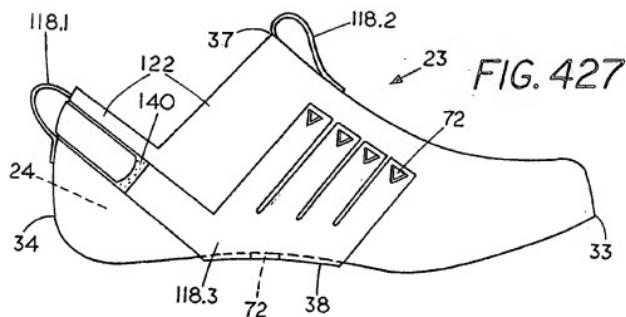


FIG. 427

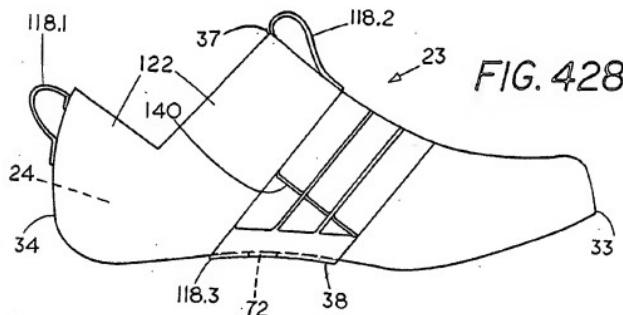


FIG. 428

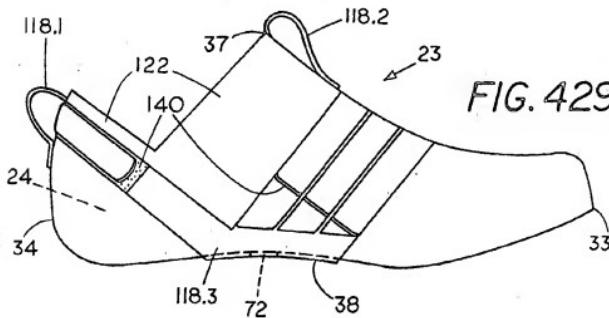


FIG. 429

FIG. 430

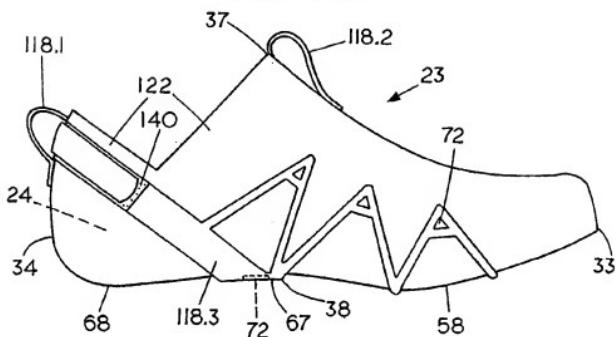


FIG. 431

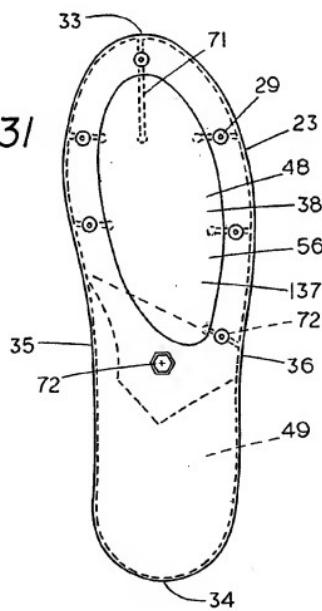


FIG. 432

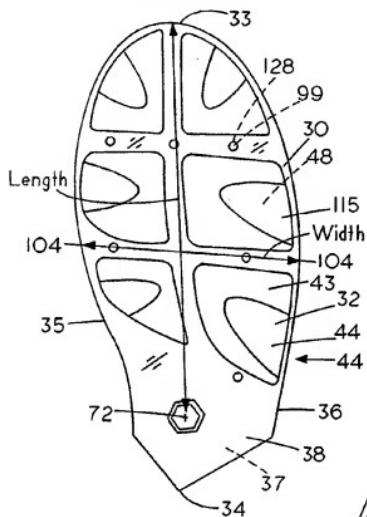


FIG. 433

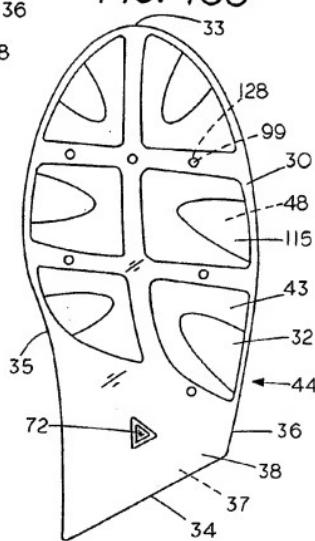


FIG. 434

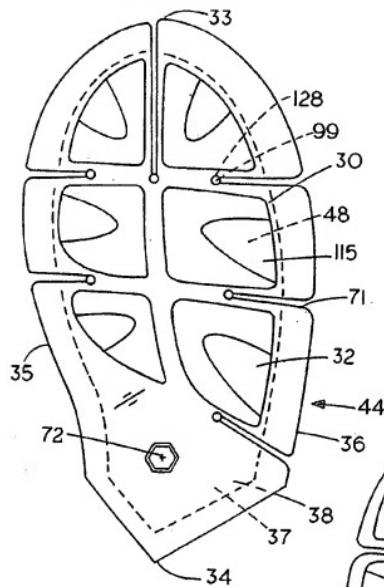
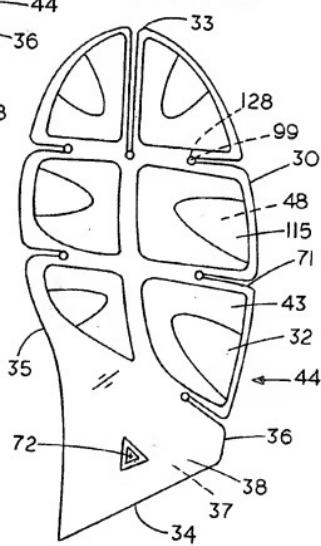
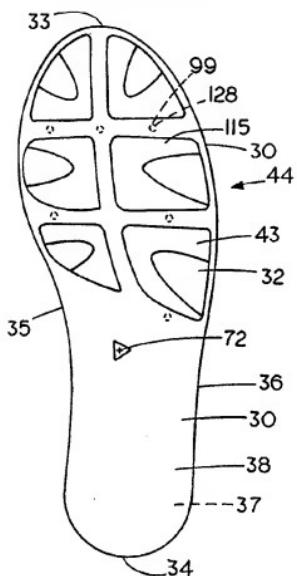
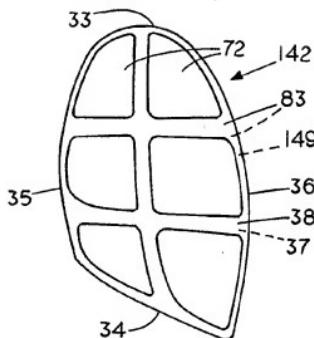
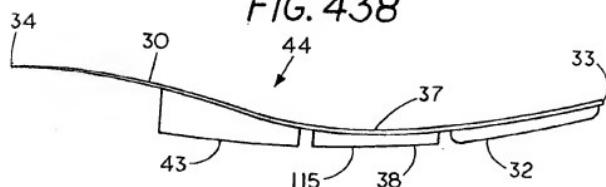


FIG. 435



*FIG. 436**FIG. 437**FIG. 438*

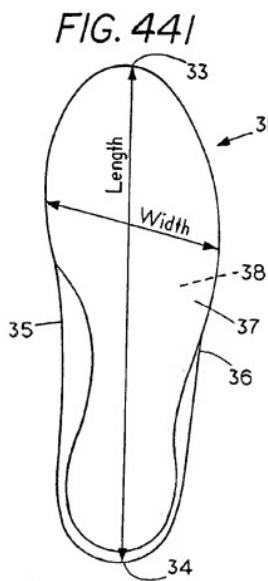
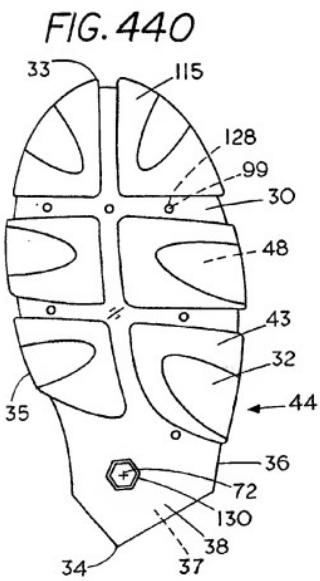
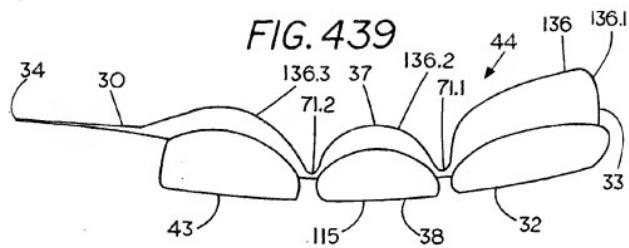


FIG. 443

FIG. 442

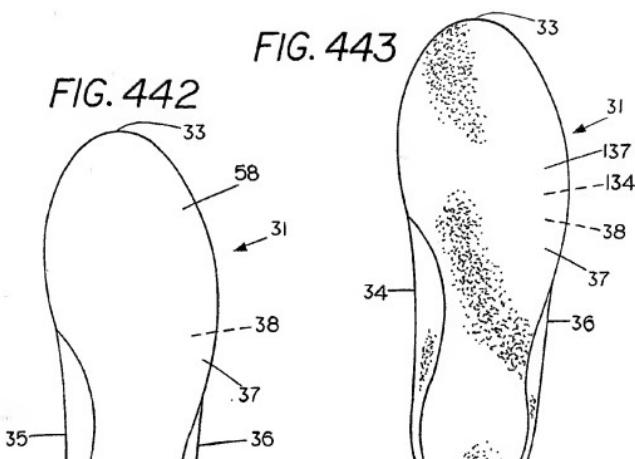
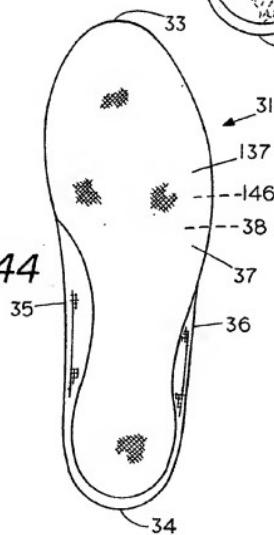
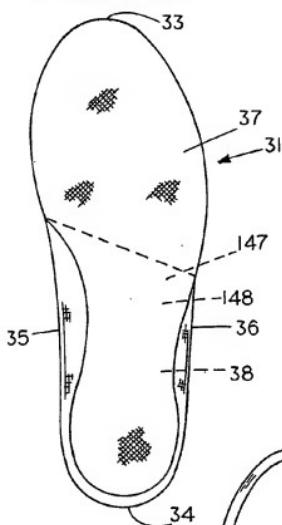
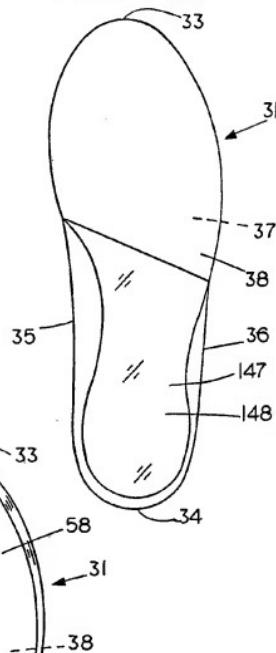
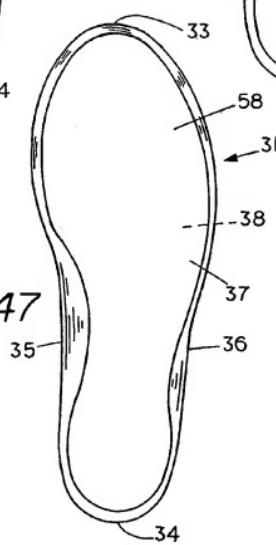


FIG. 444



*FIG. 445**FIG. 446**FIG. 447*

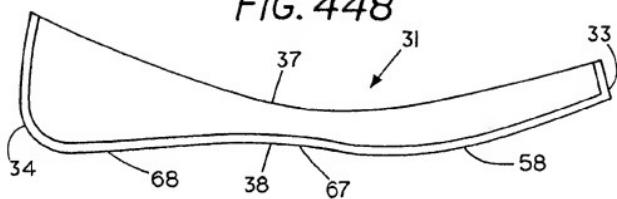
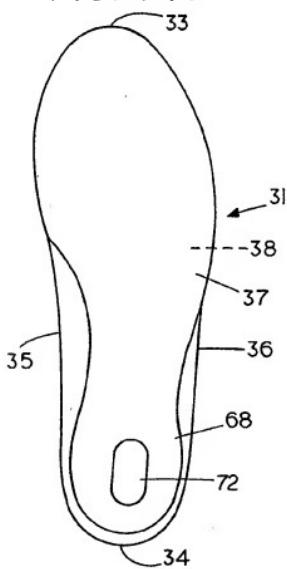
*FIG. 448**FIG. 449*

FIG. 450

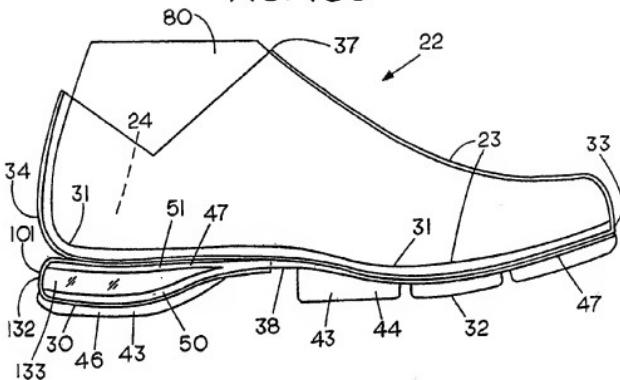


FIG. 451

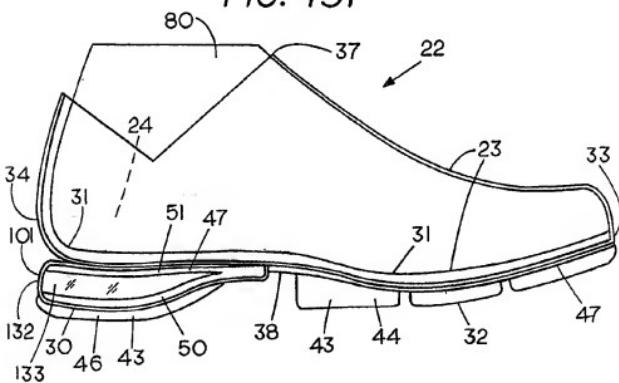


FIG. 452

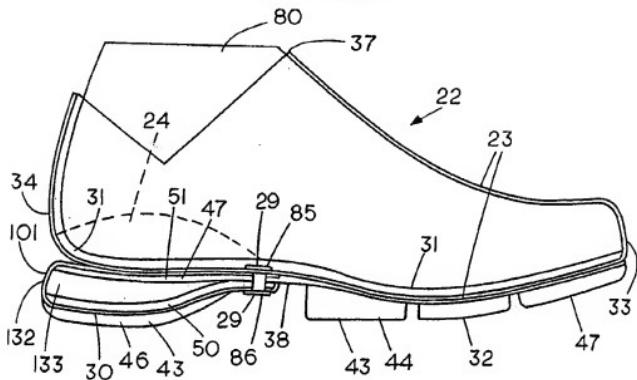


FIG. 453

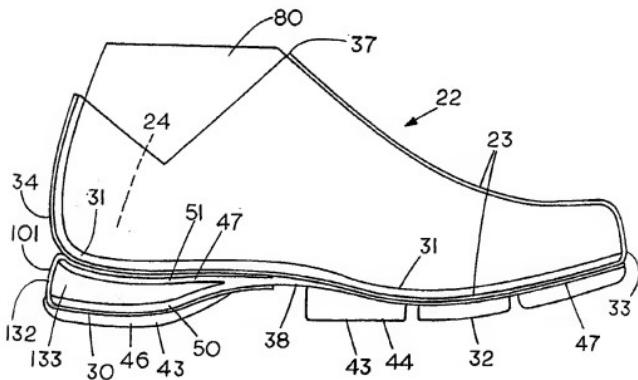


FIG. 454

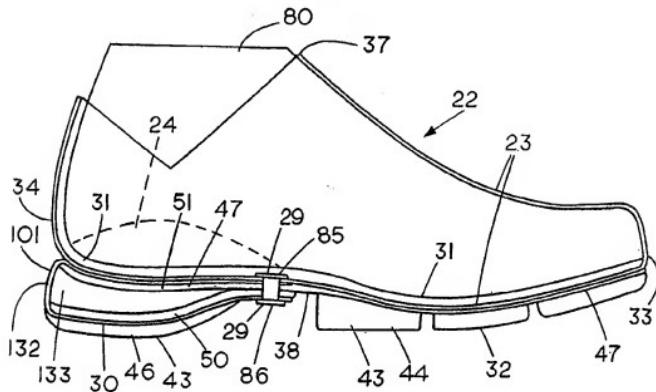


FIG. 455

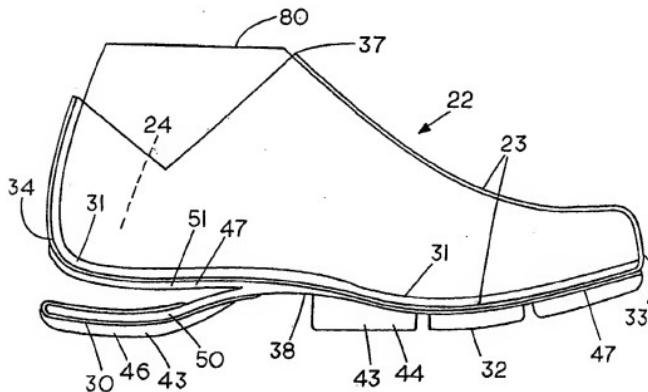


FIG. 456

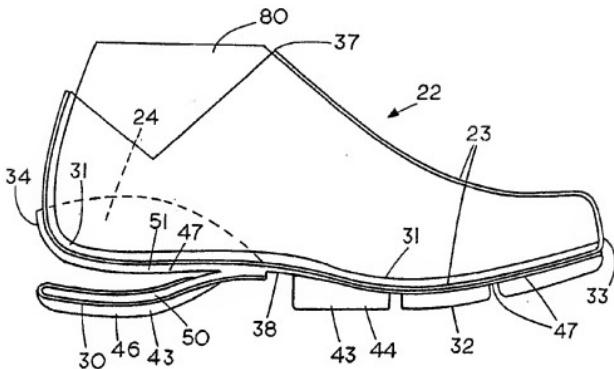
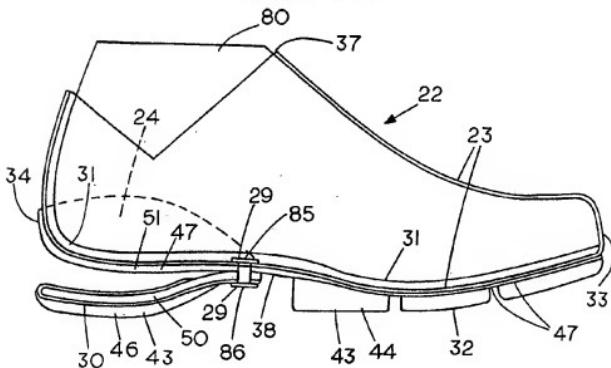
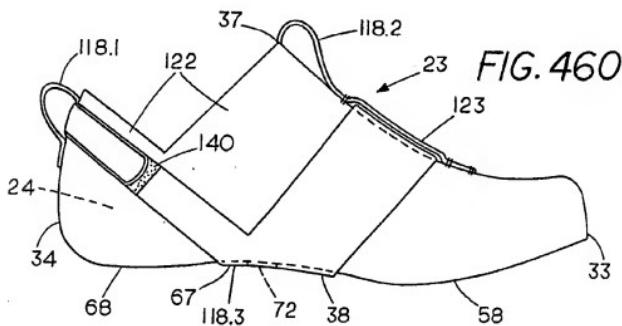
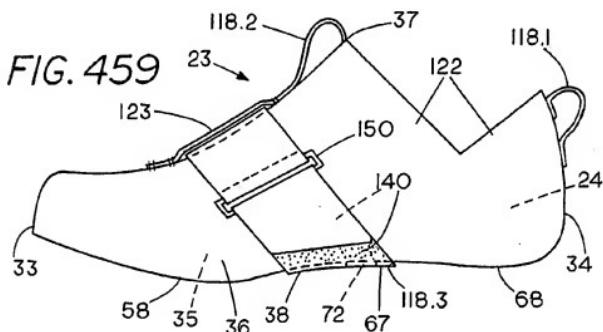
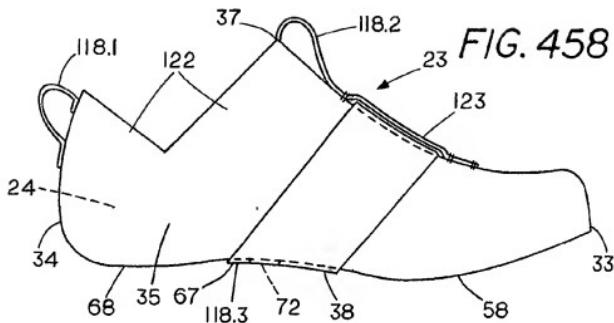


FIG. 457





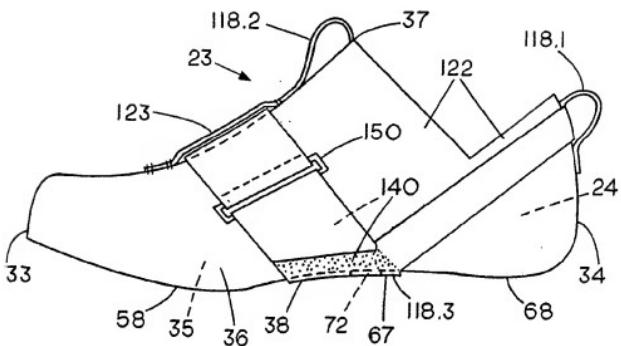
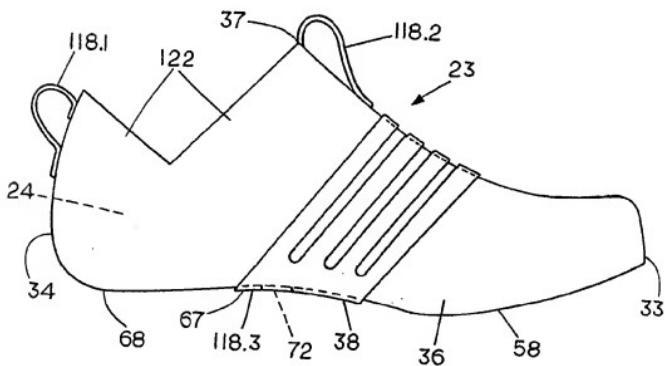
*FIG. 461**FIG. 462*

FIG. 463

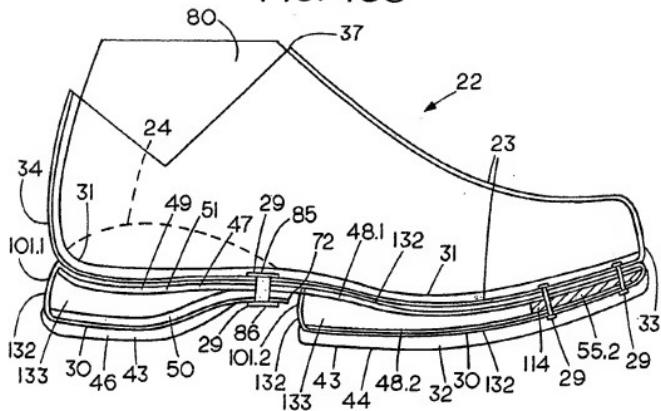


FIG. 464

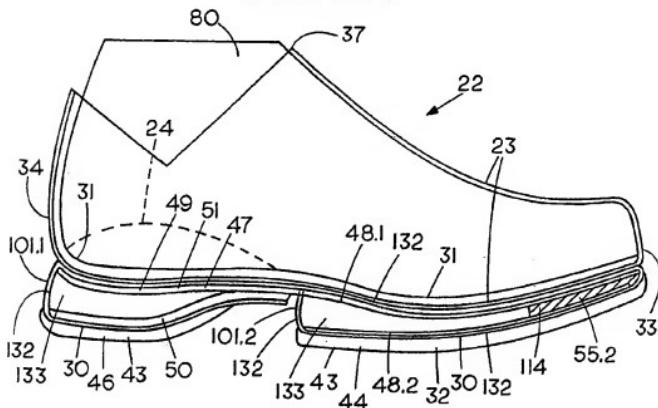


FIG. 465

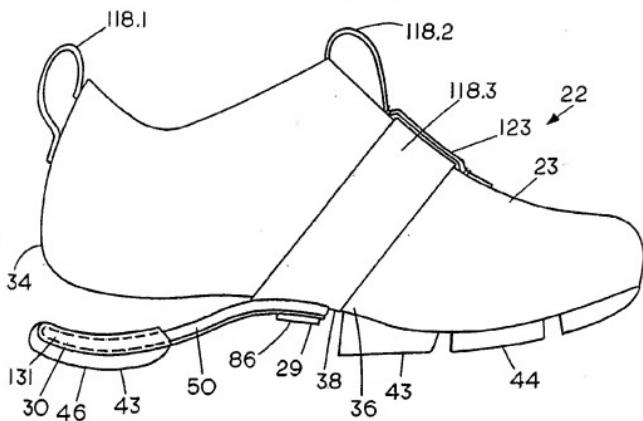


FIG. 466

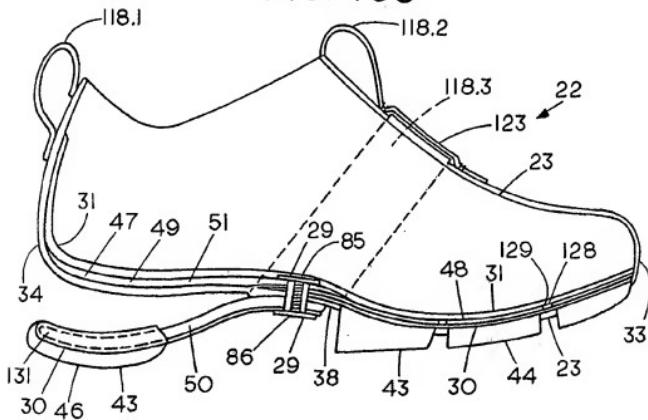
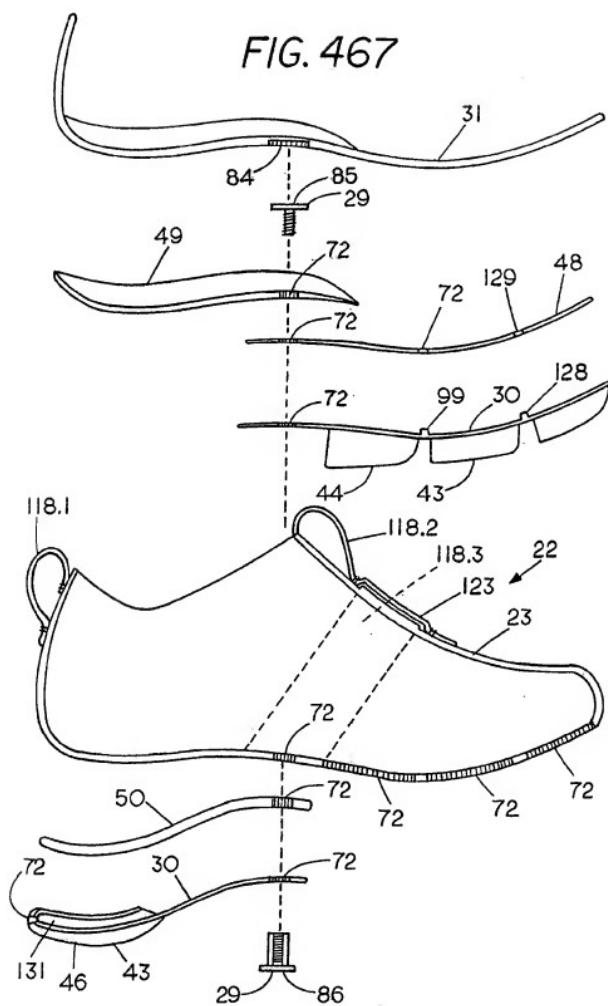


FIG. 467



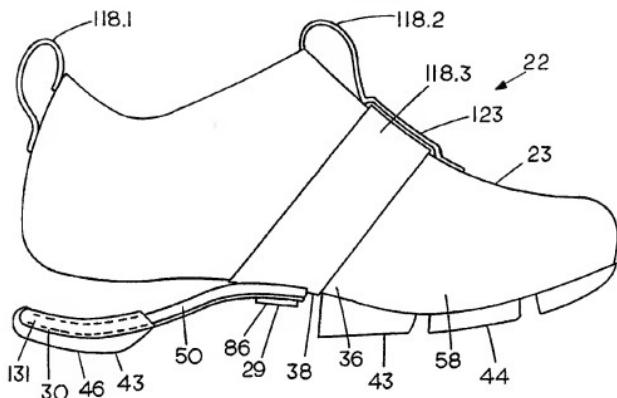
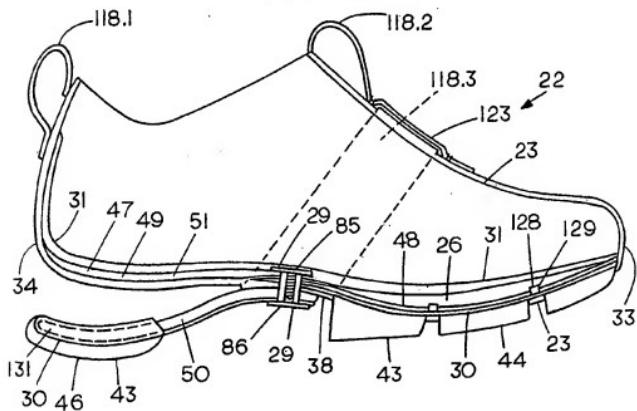
*FIG. 468**FIG. 469*

FIG. 470

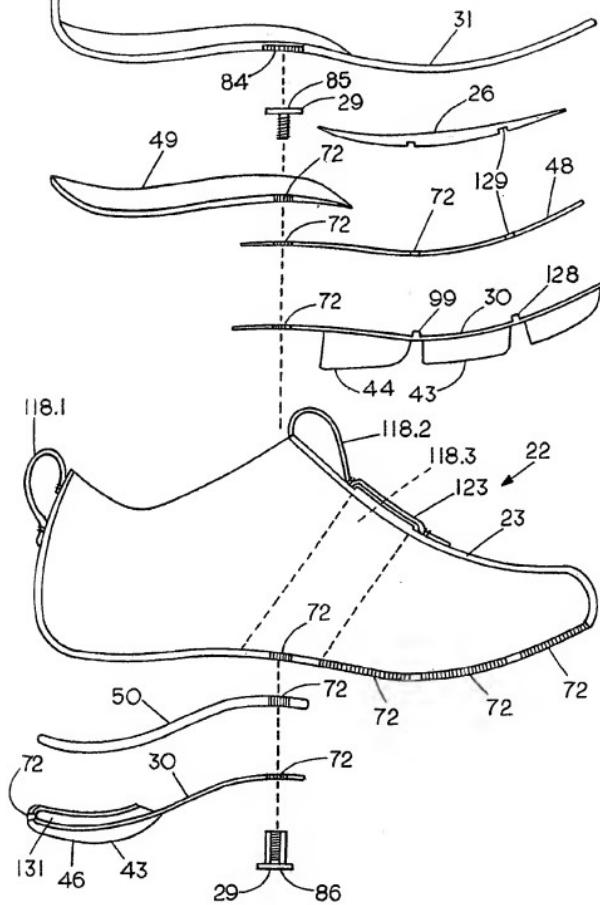


FIG. 471

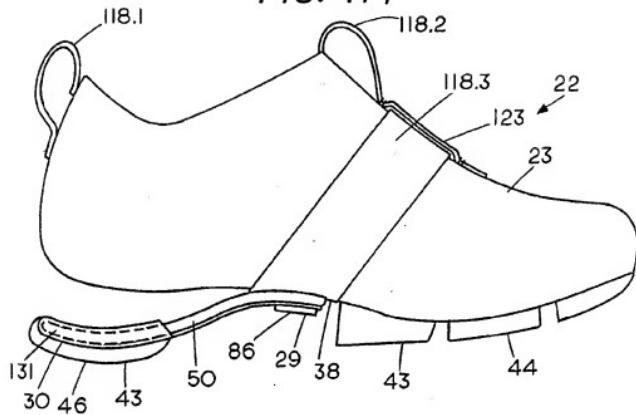


FIG. 472

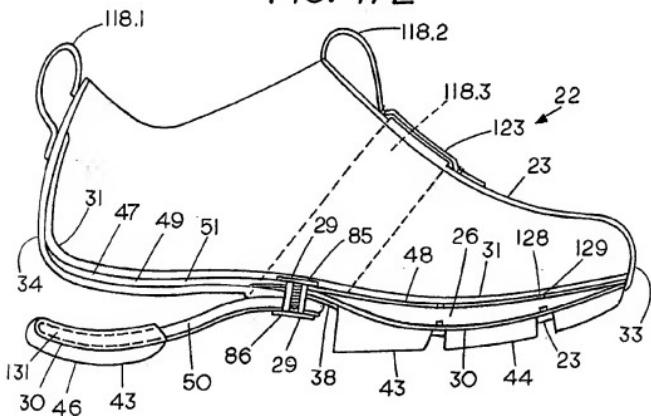


FIG. 473

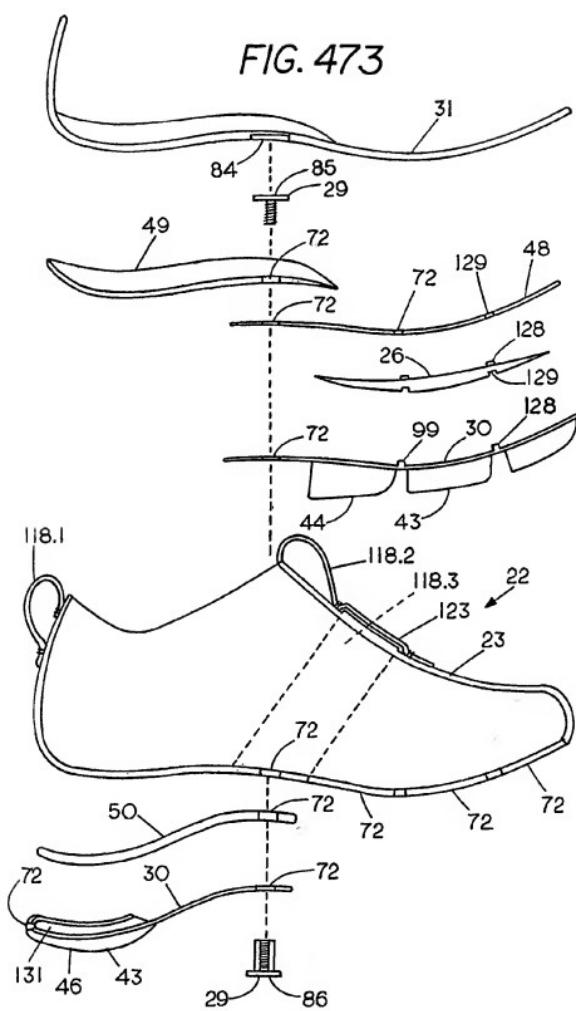


FIG. 474

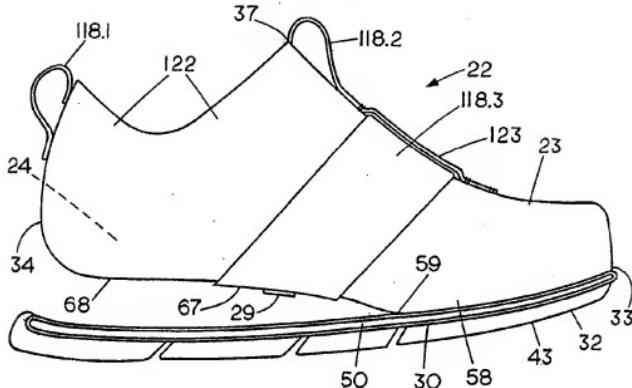


FIG. 475

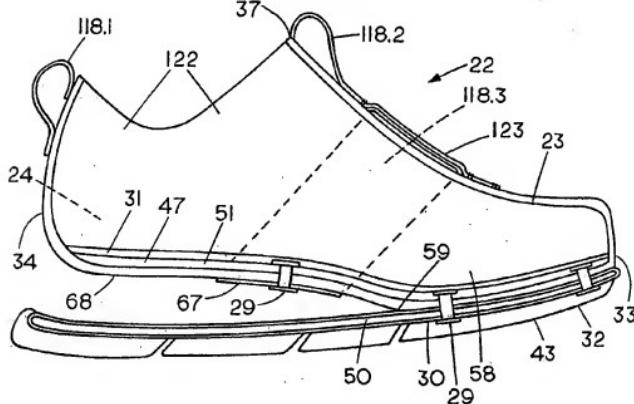


FIG. 476

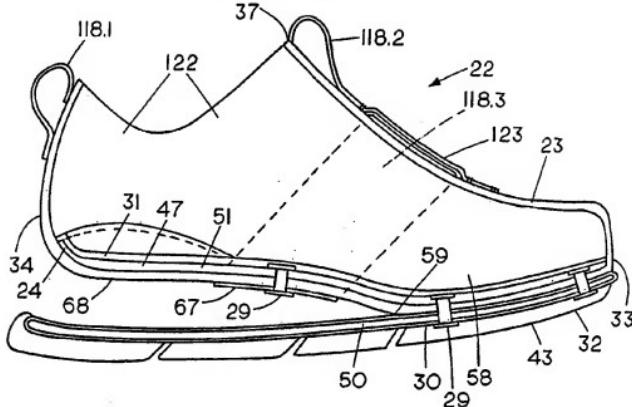


FIG. 477

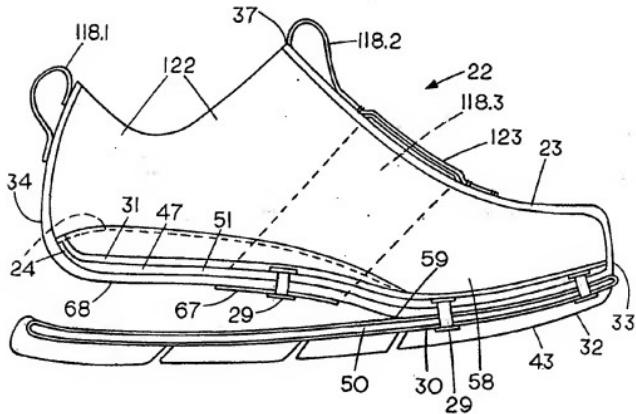


FIG. 478

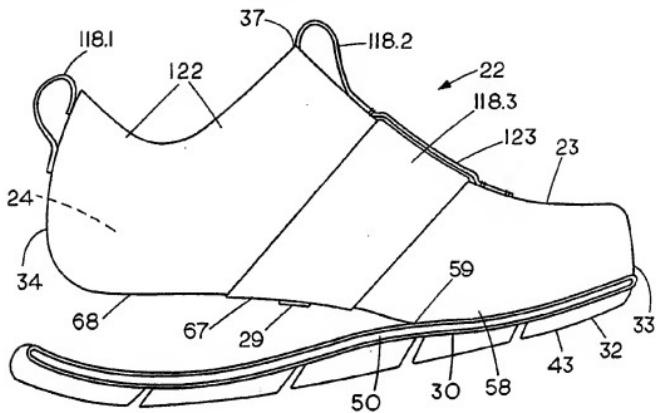


FIG. 479

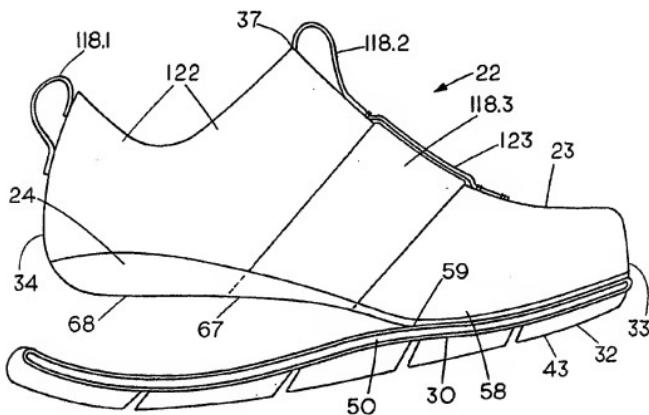


FIG. 480

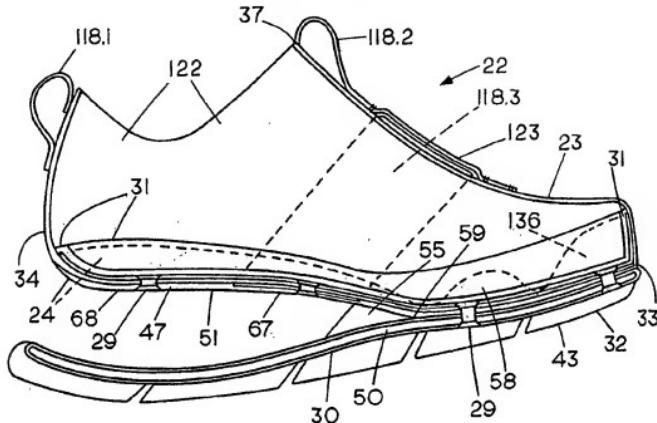


FIG. 481

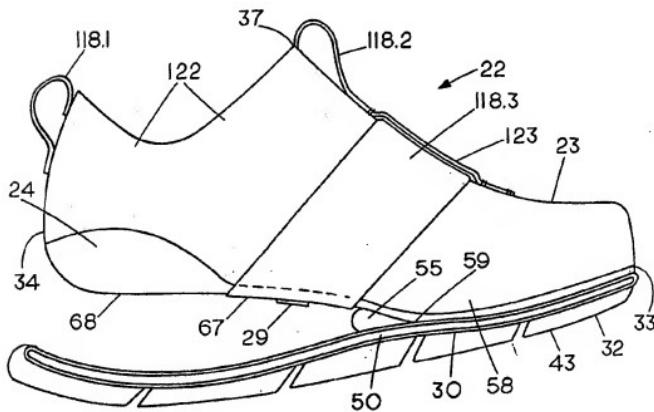


FIG. 482

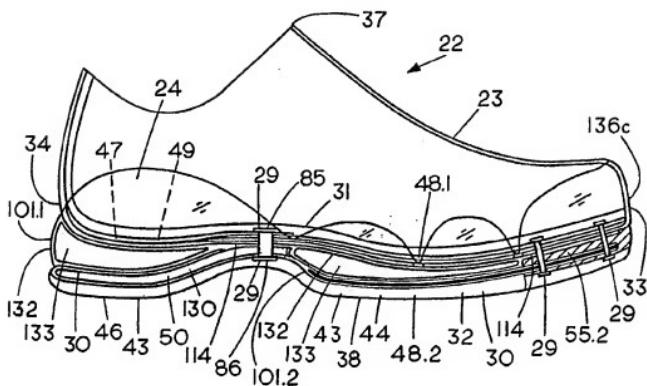


FIG. 483

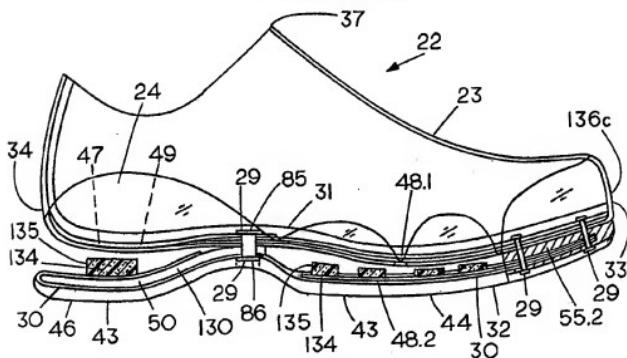


FIG. 484

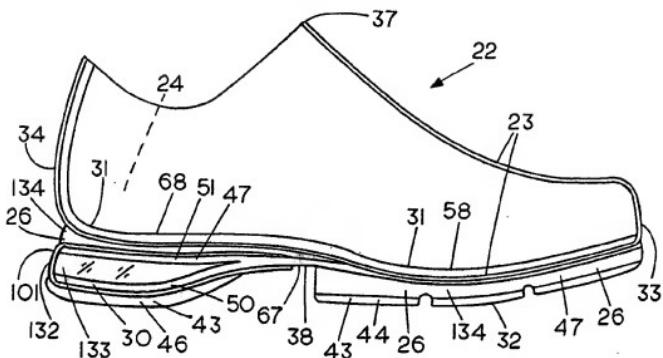


FIG. 485

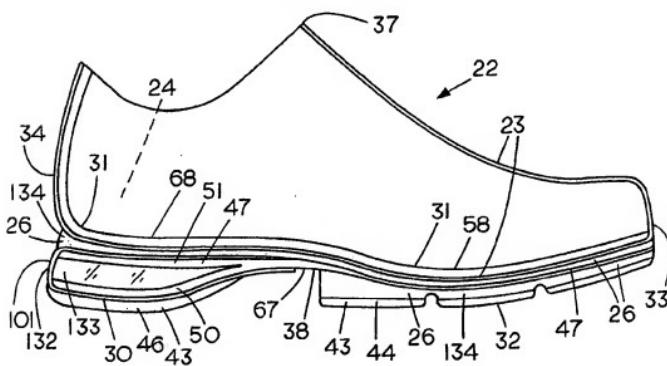


FIG. 486

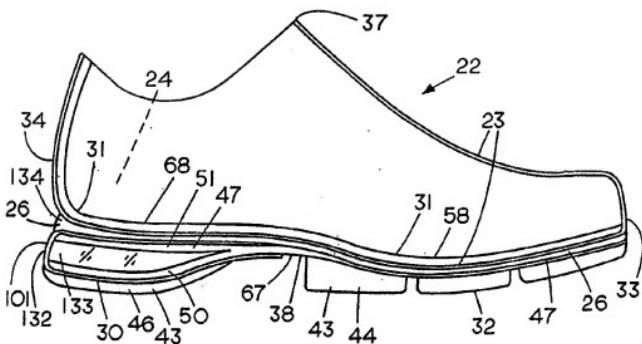
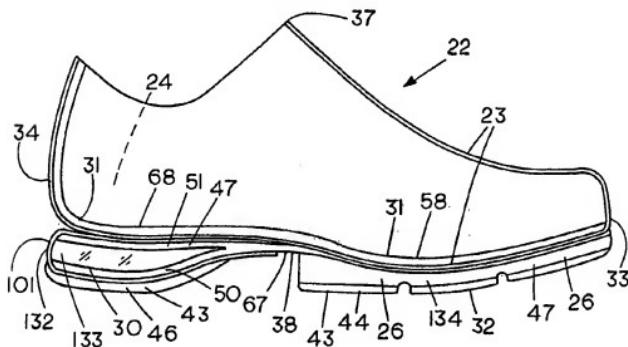


FIG. 487



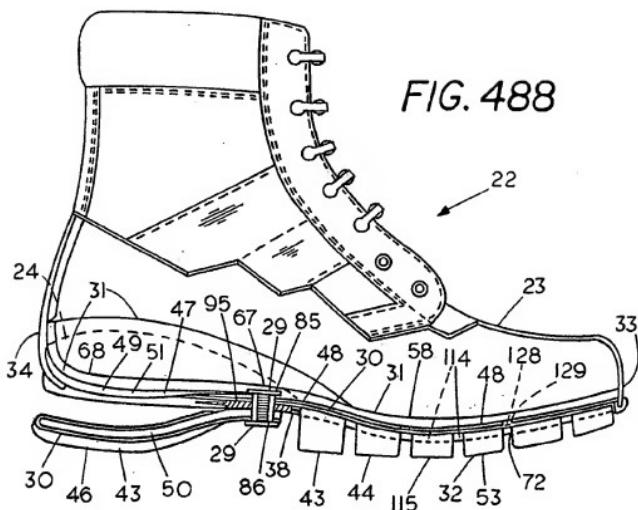
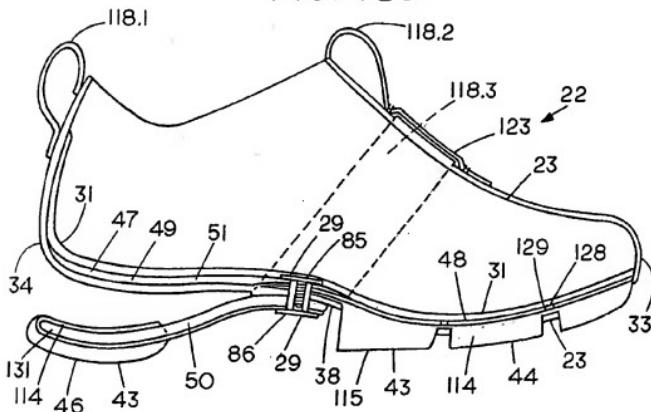
*FIG. 488**FIG. 489*

FIG. 490

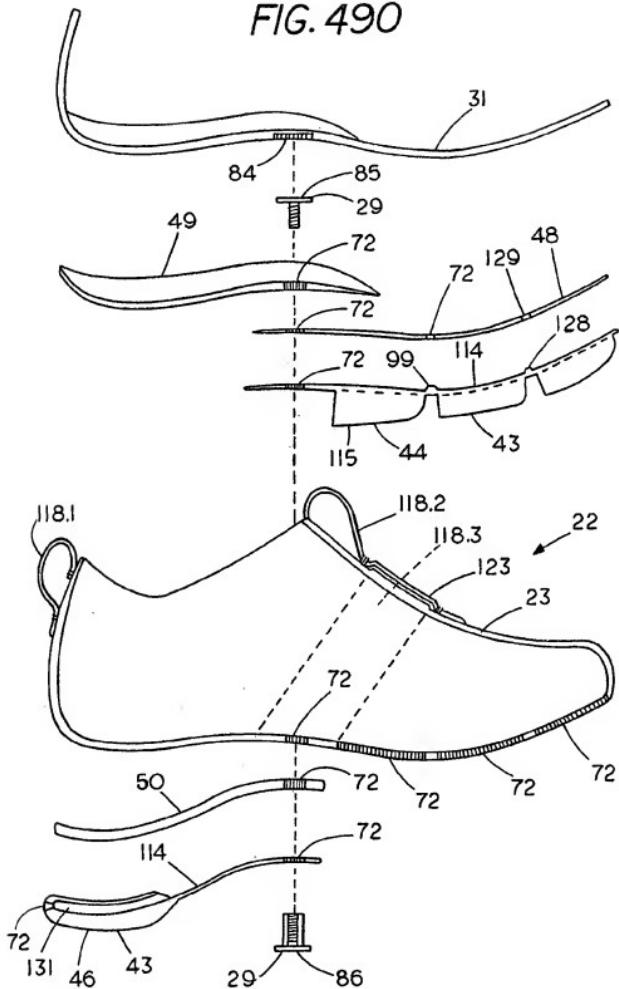


FIG. 49I

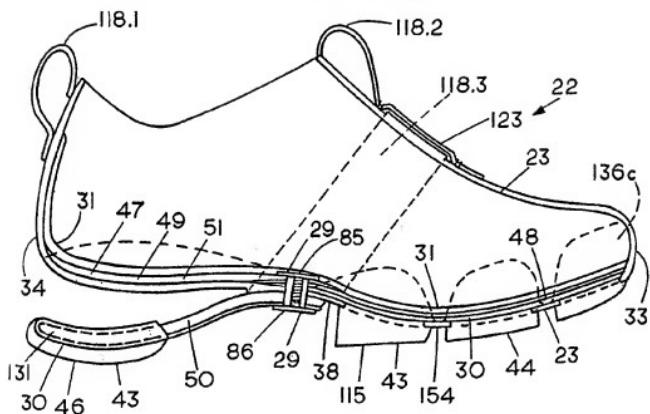


FIG. 492

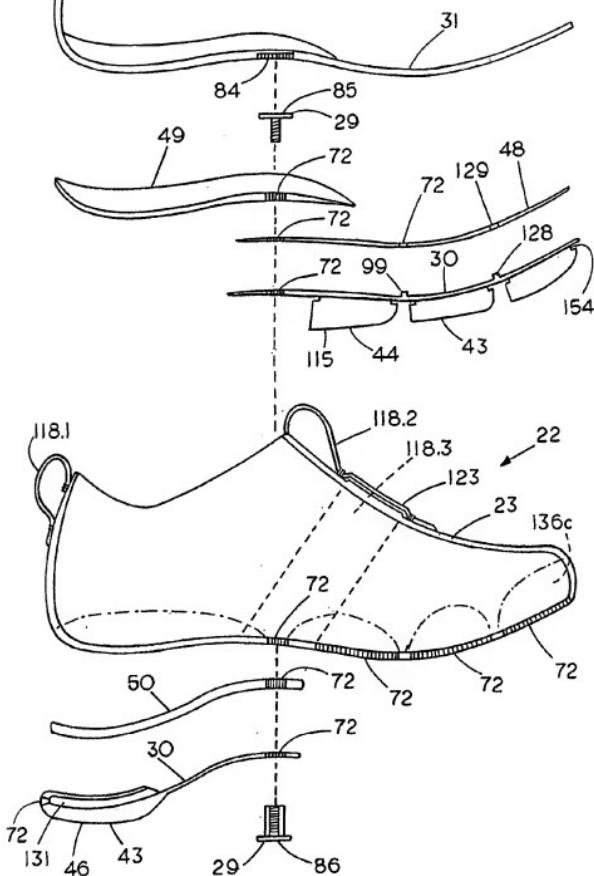


FIG. 493

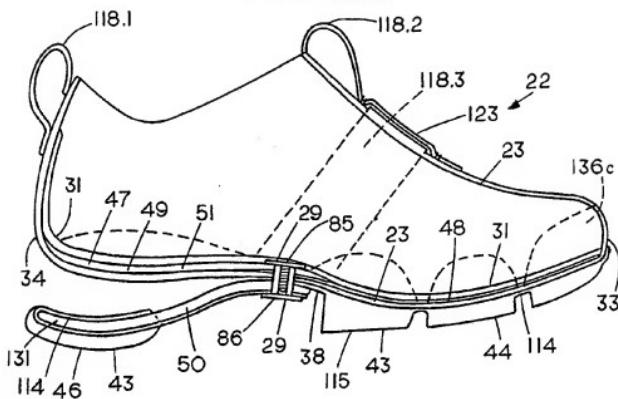
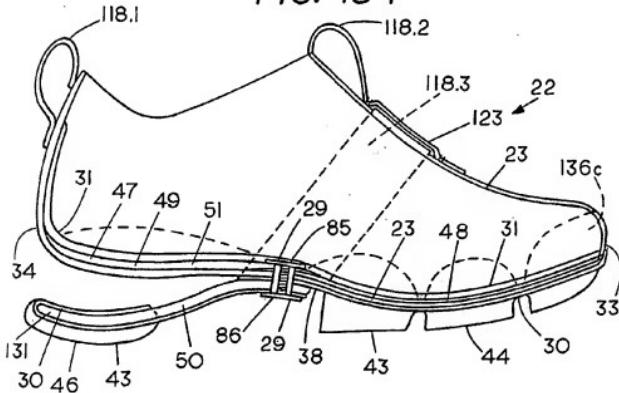
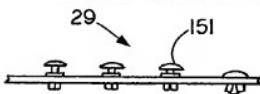
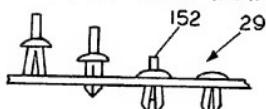
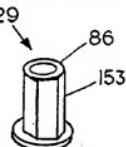
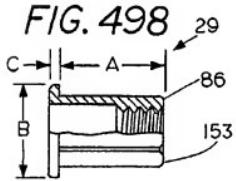
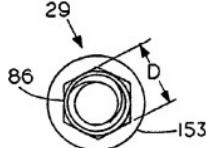
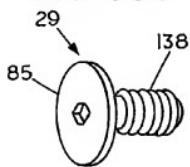


FIG. 494



*FIG. 495 (PRIOR ART)**FIG. 496 (PRIOR ART)**FIG. 497**FIG. 498**FIG. 499**FIG. 500*

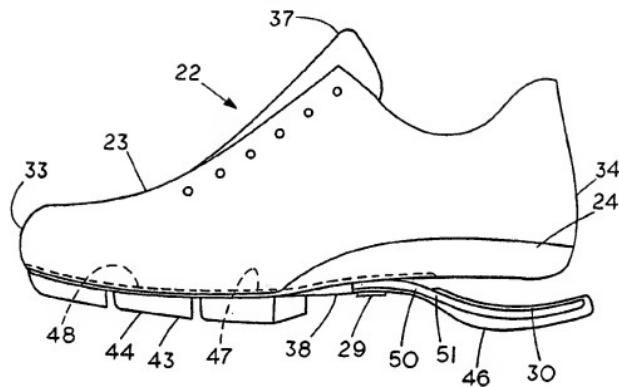
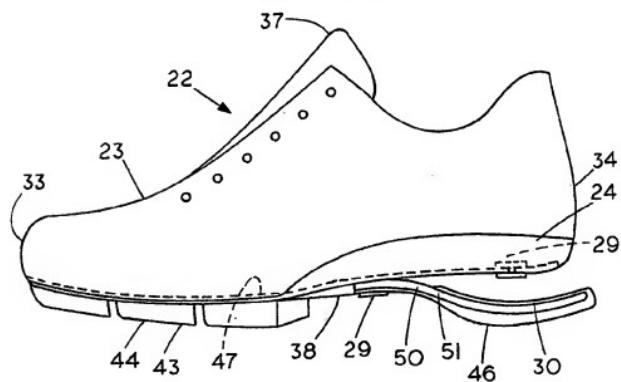
*FIG. 501**FIG. 502*

FIG. 503

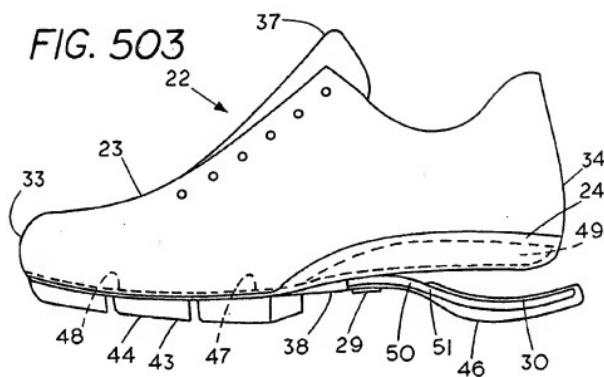
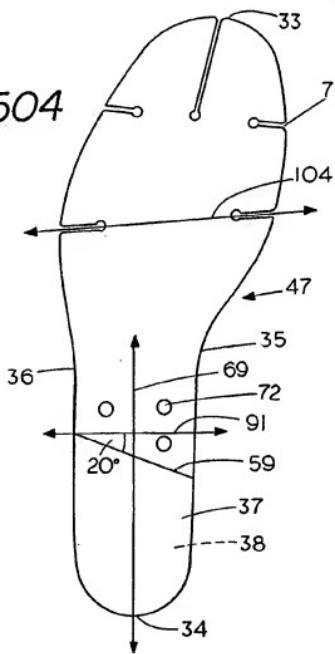


FIG. 504



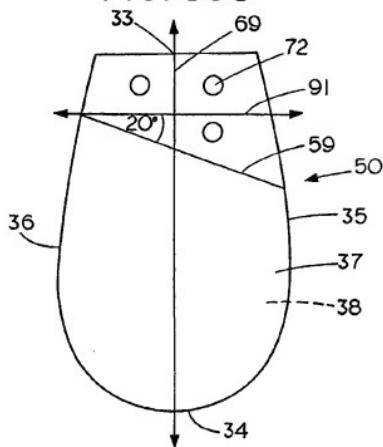
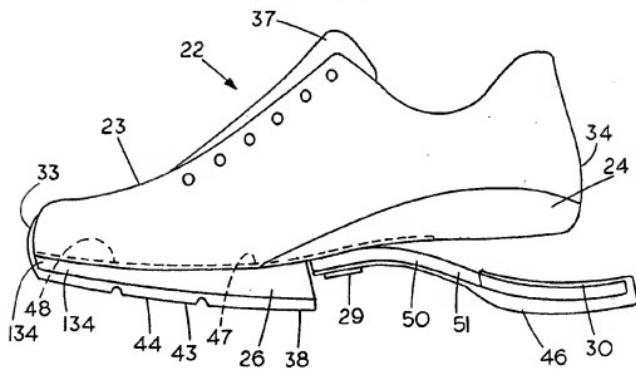
*FIG. 505**FIG. 506*

FIG. 507

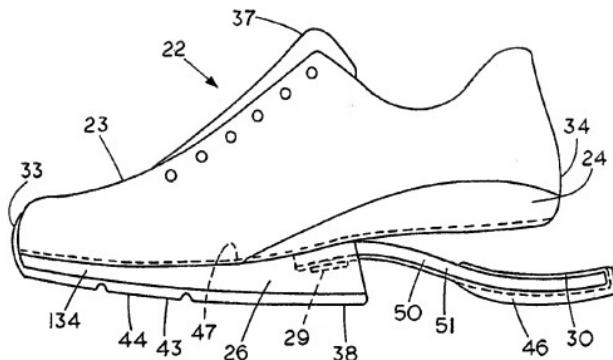
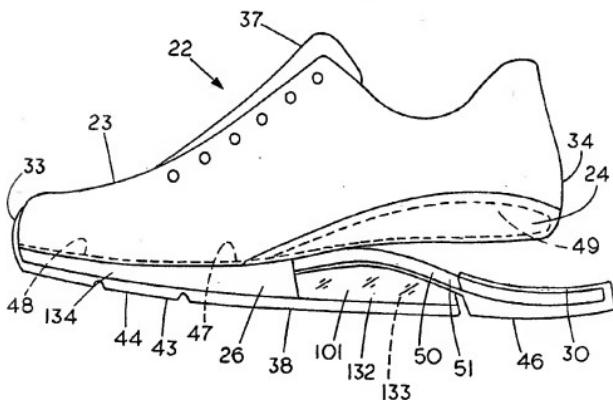
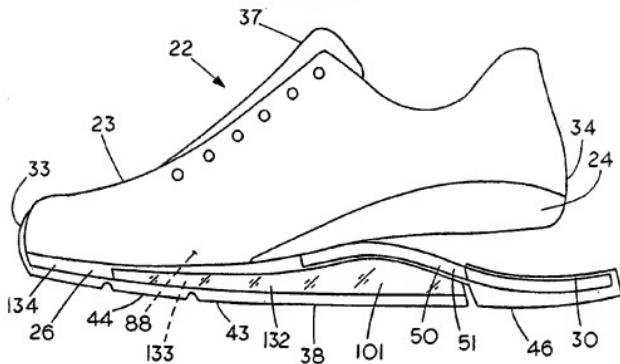
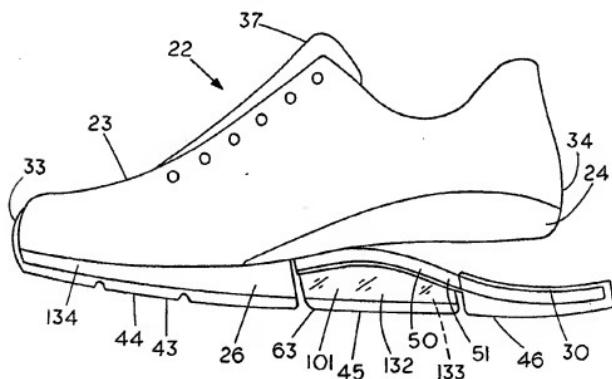
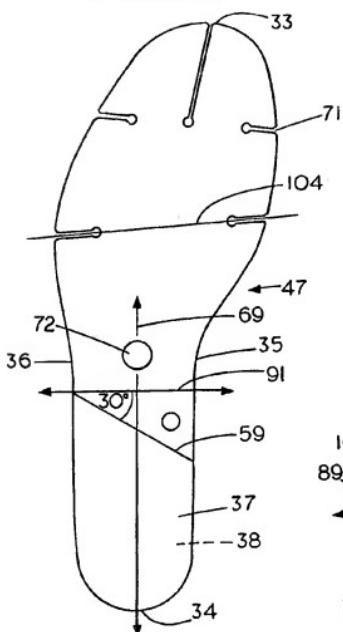
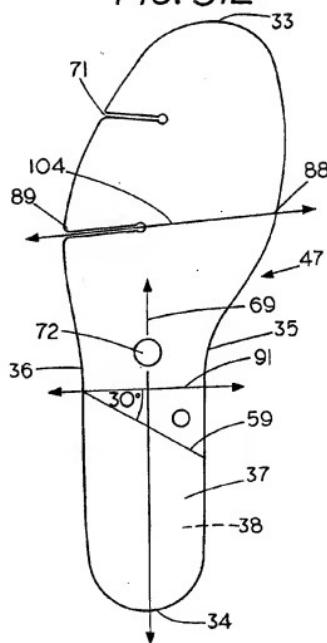
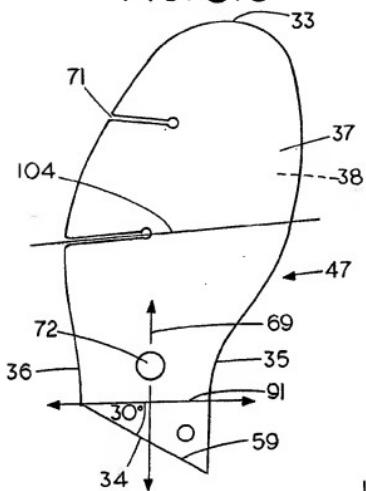
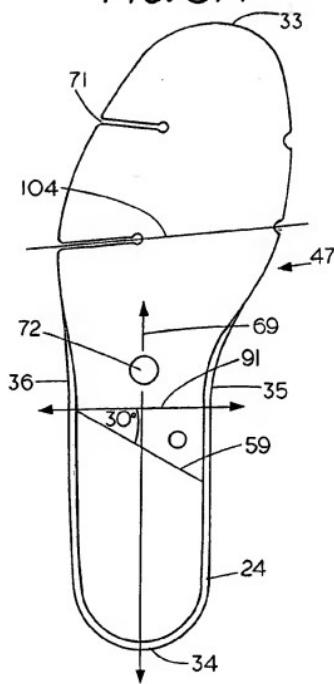


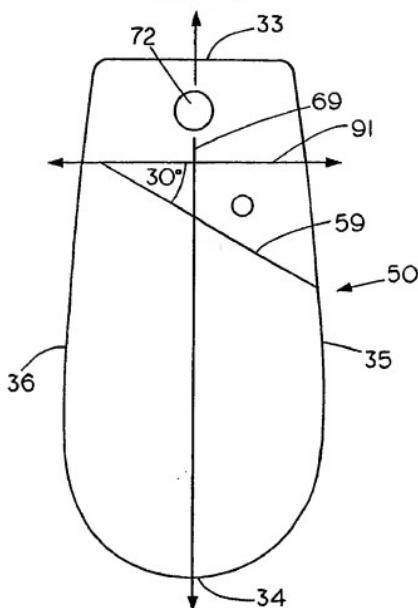
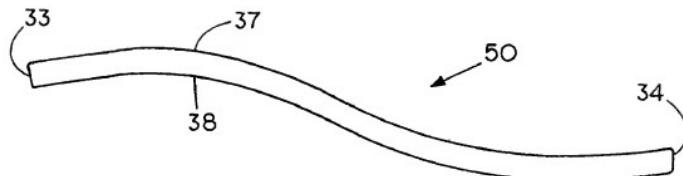
FIG. 508



*FIG. 509**FIG. 510*

*FIG. 5/1**FIG. 5/2*

*FIG. 5/3**FIG. 5/4*

*FIG. 5/5**FIG. 5/6*

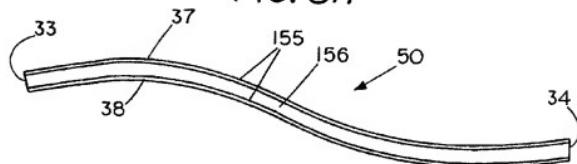
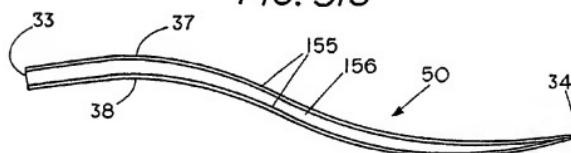
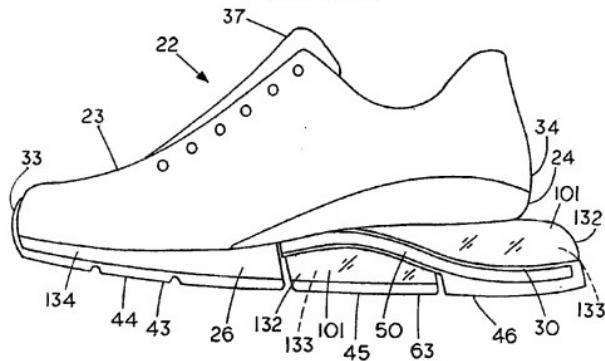
*FIG. 5/7**FIG. 5/8**FIG. 5/9*

FIG. 520

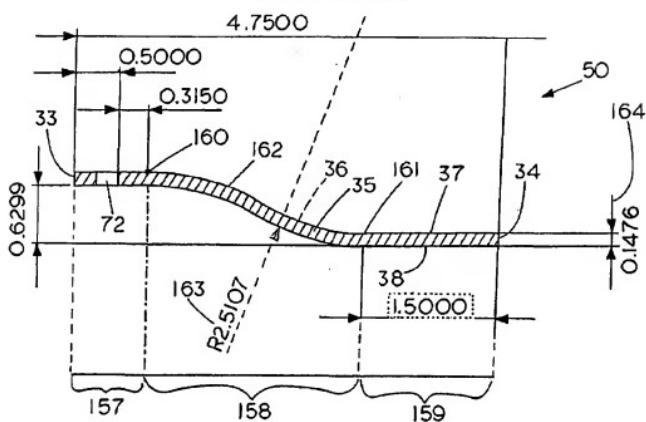


FIG. 521

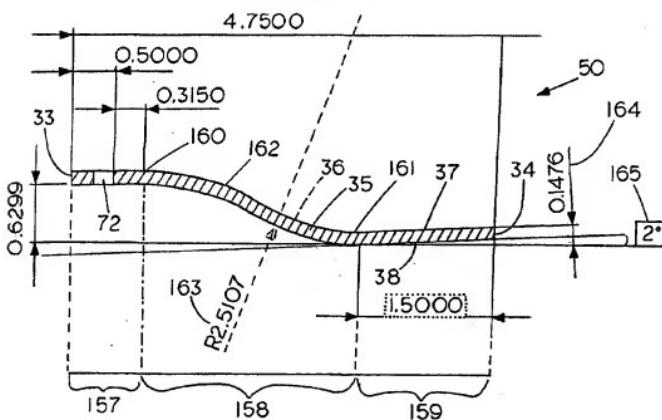


FIG. 522

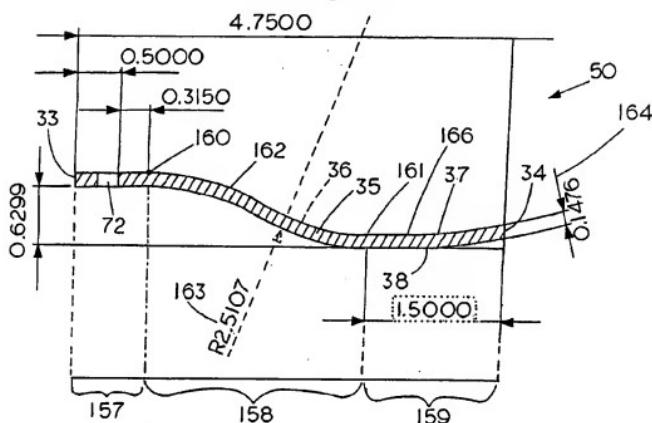


FIG. 523

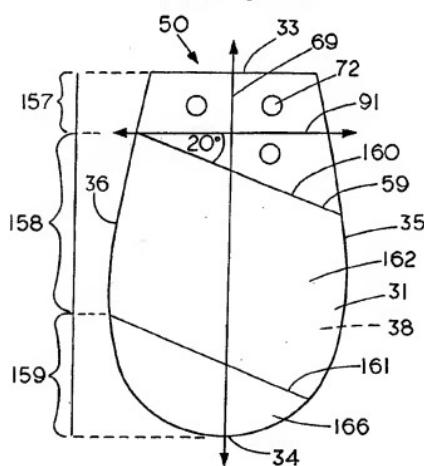


FIG. 524

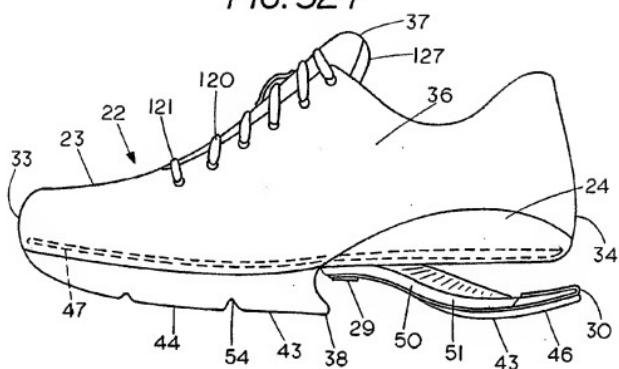


FIG. 525

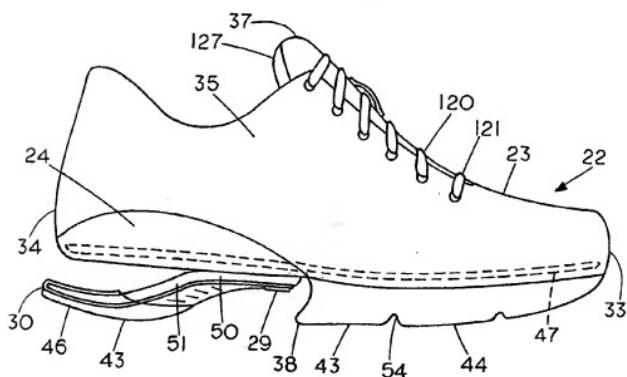
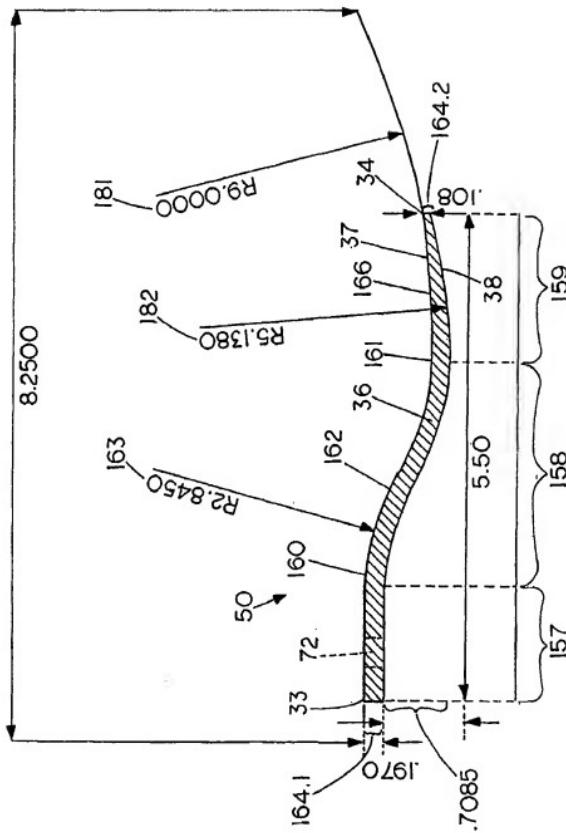
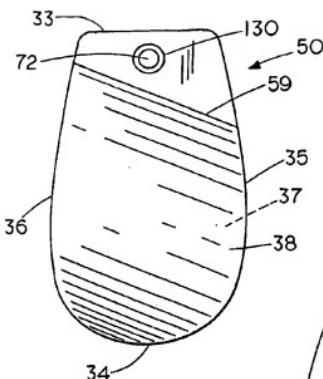
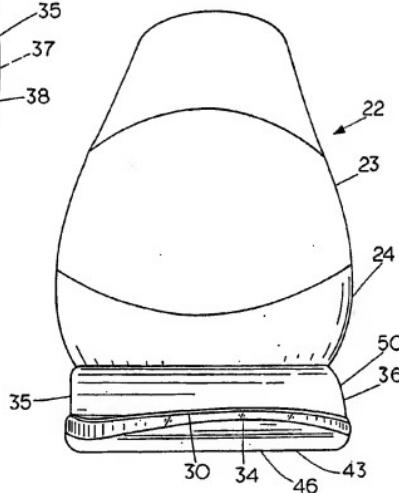
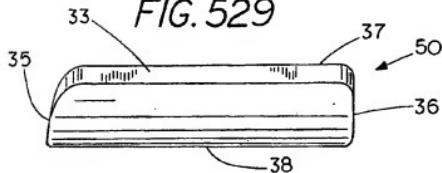
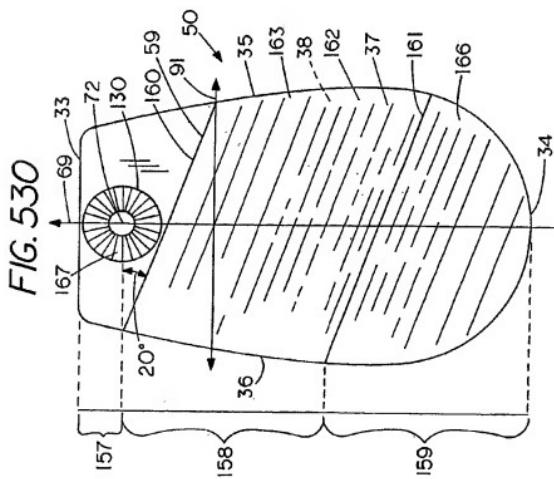
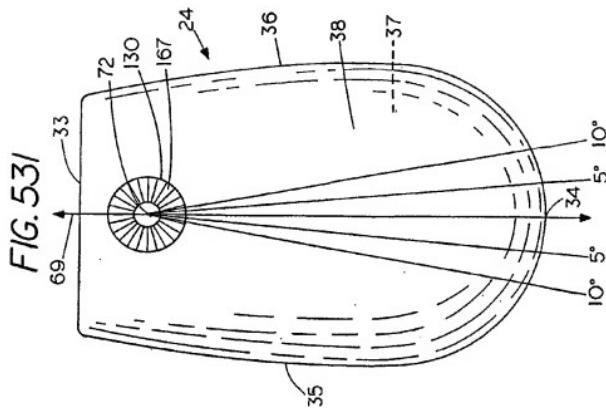


FIG. 526



*FIG. 527**FIG. 528**FIG. 529*



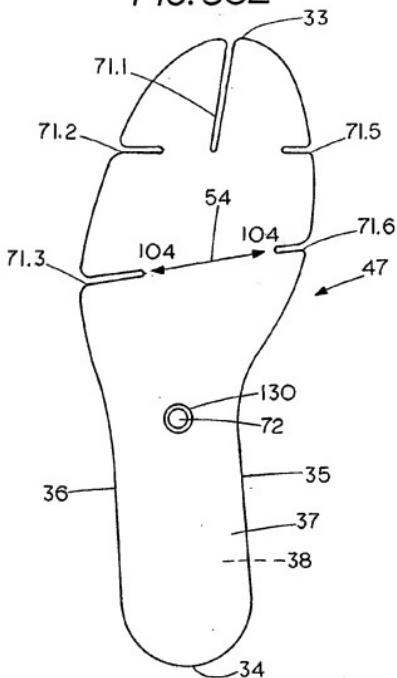
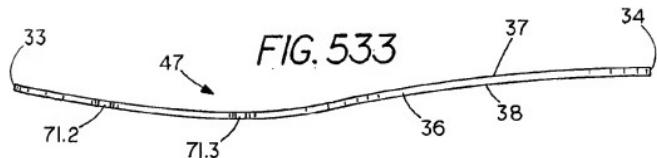
*FIG. 532**FIG. 533*

FIG. 534

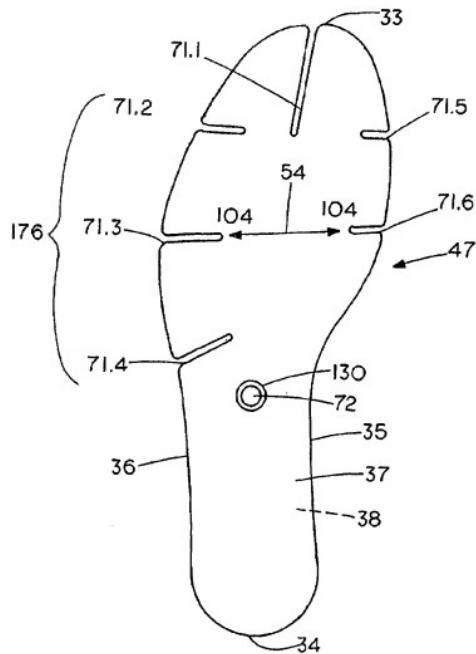
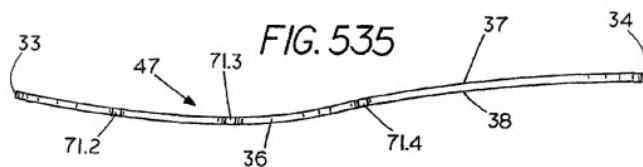
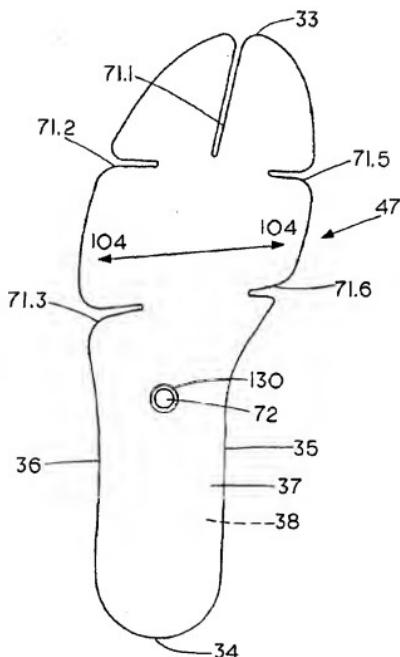
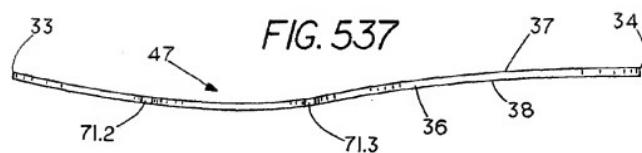


FIG. 535



*FIG. 536**FIG. 537*

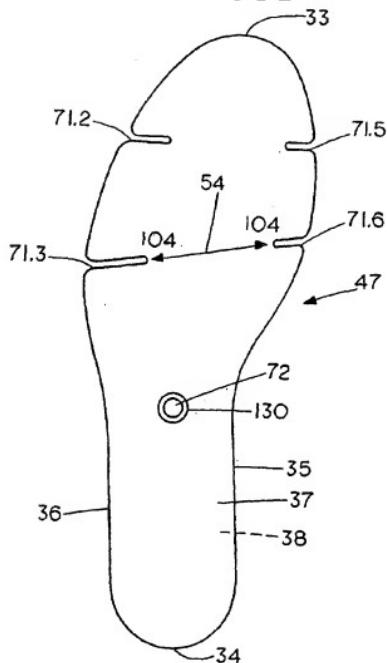
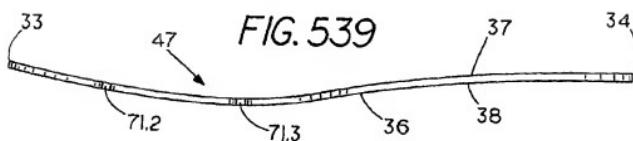
*FIG. 538**FIG. 539*

FIG. 540

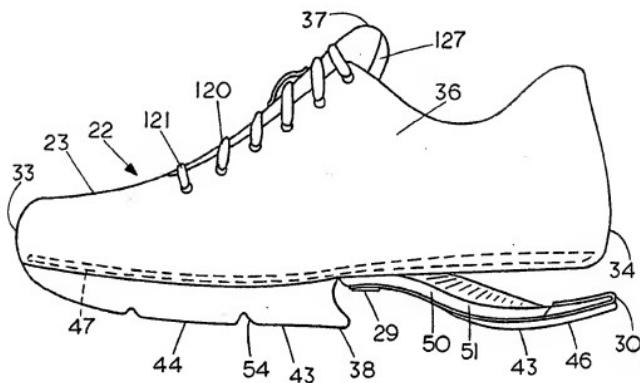
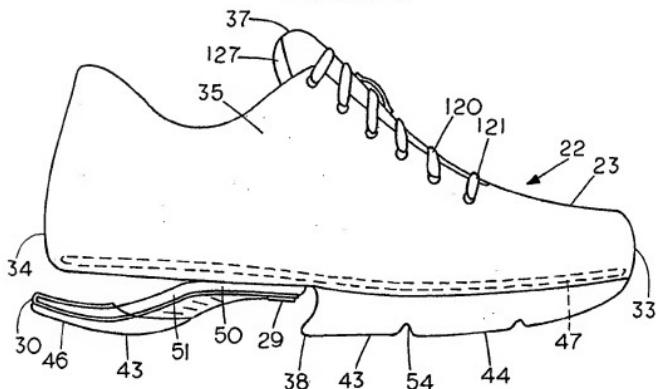


FIG. 541



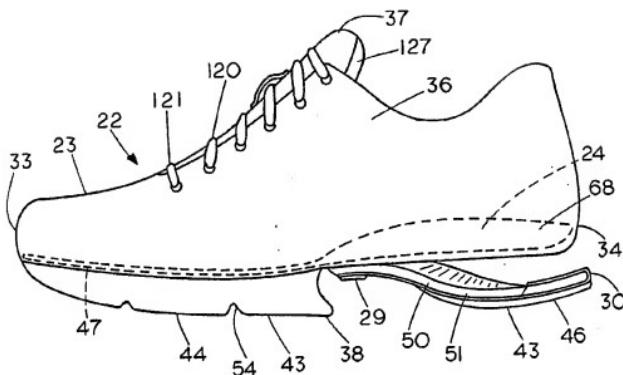
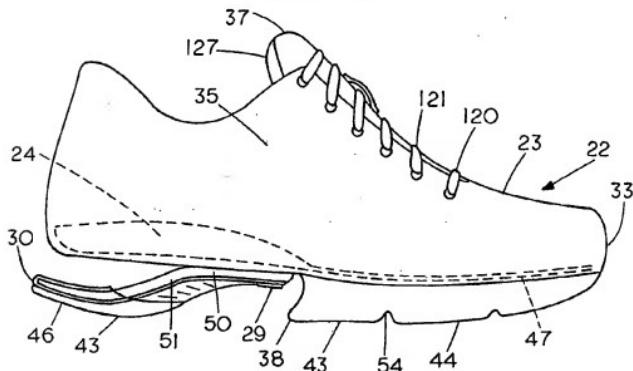
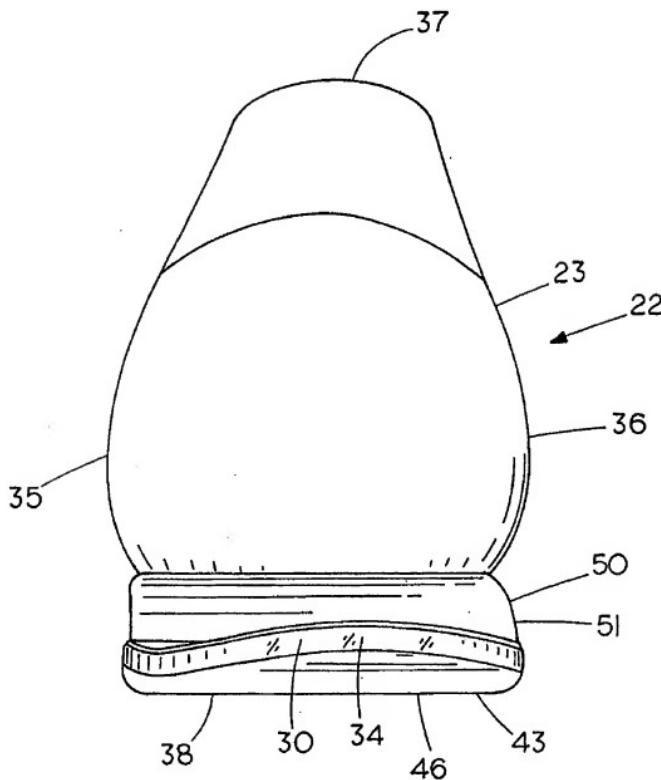
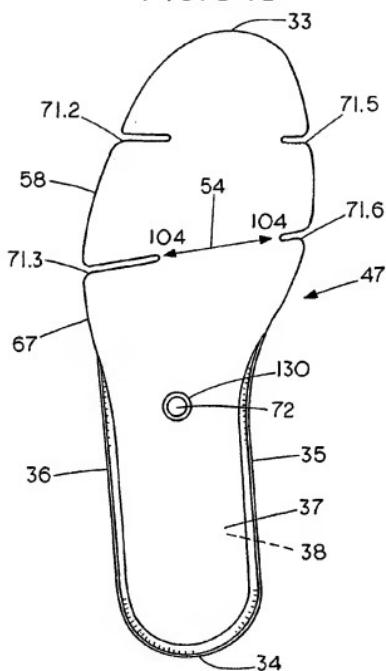
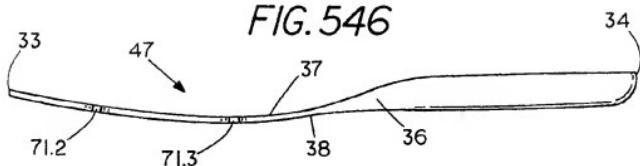
*FIG. 542**FIG. 543*

FIG. 544



*FIG. 545**FIG. 546*

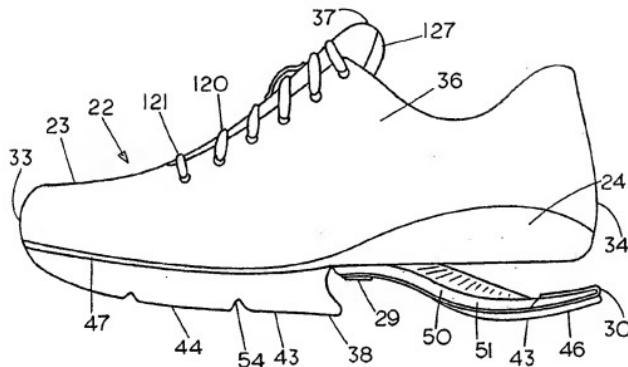
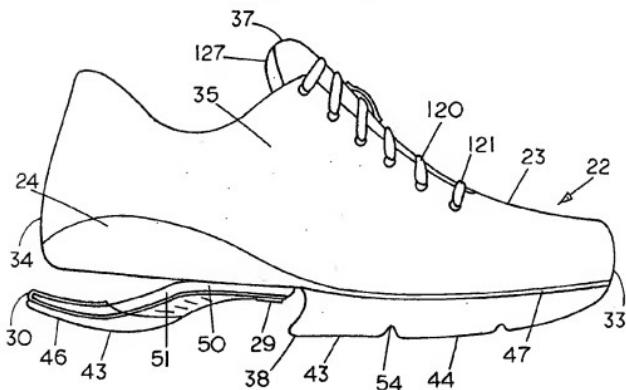
*FIG. 547**FIG. 548*

FIG. 549

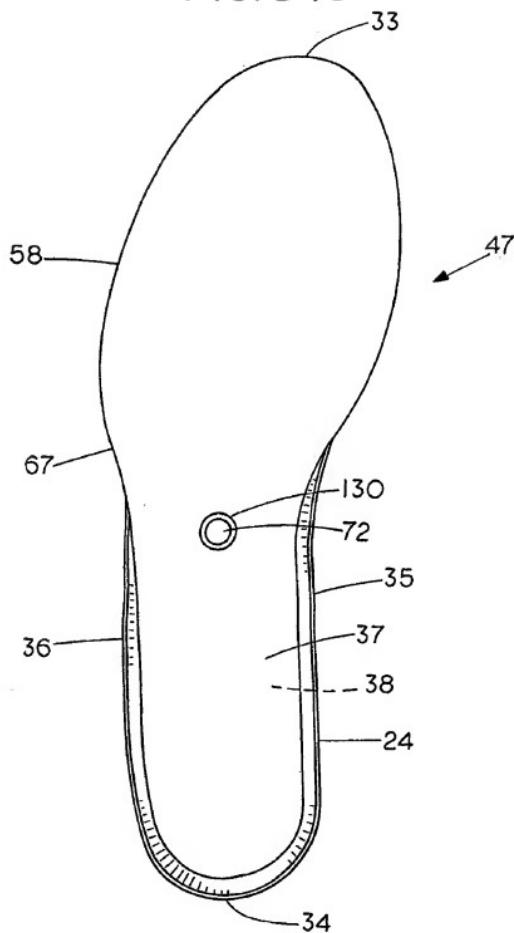


FIG. 550

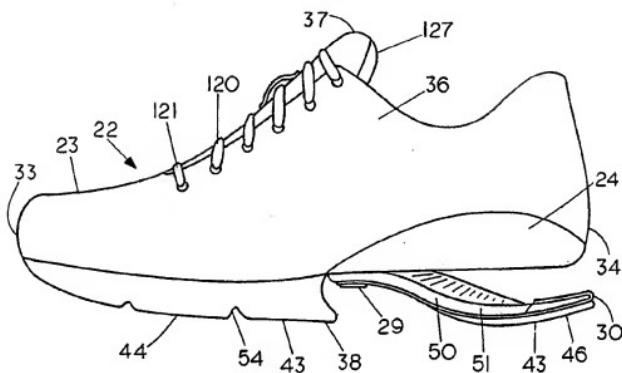


FIG. 551

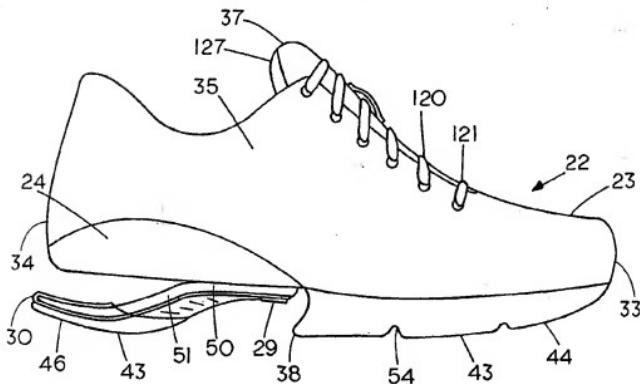


FIG. 552

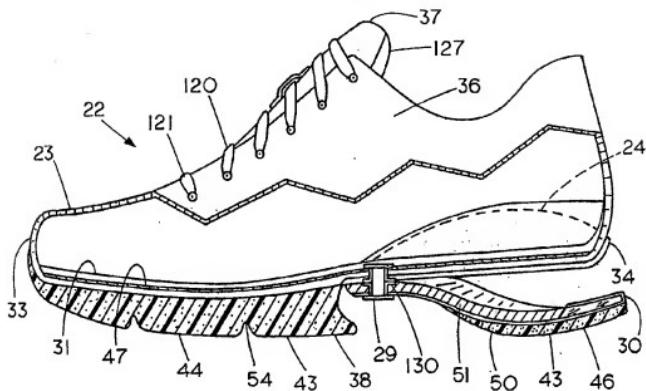


FIG. 553

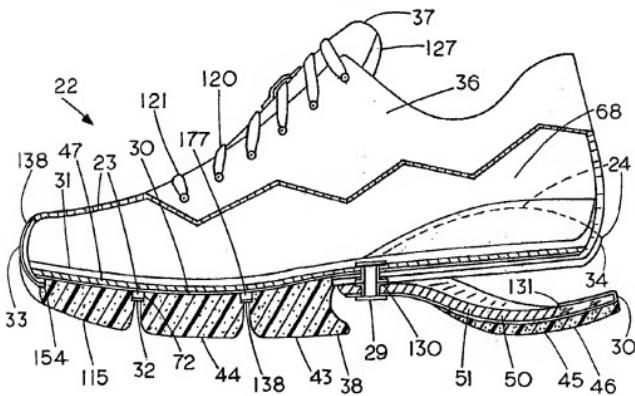


FIG. 554

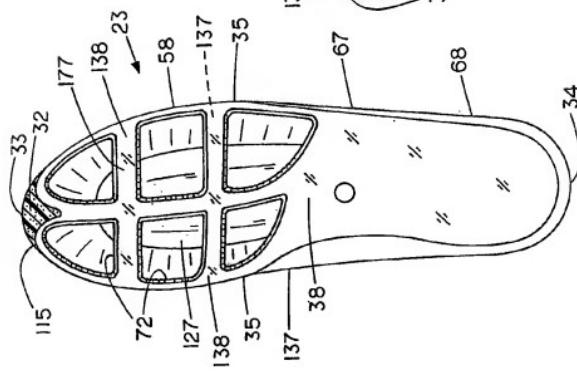
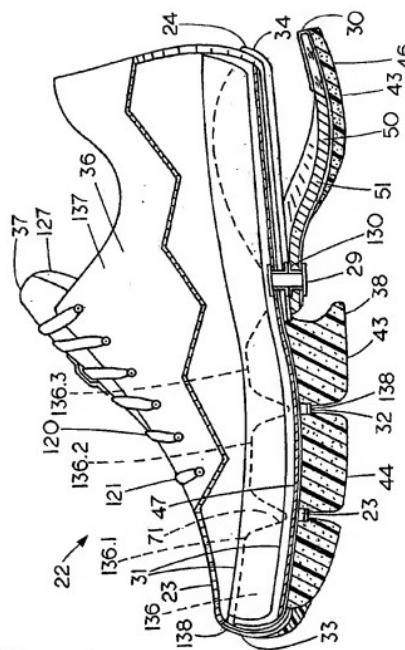


FIG. 555



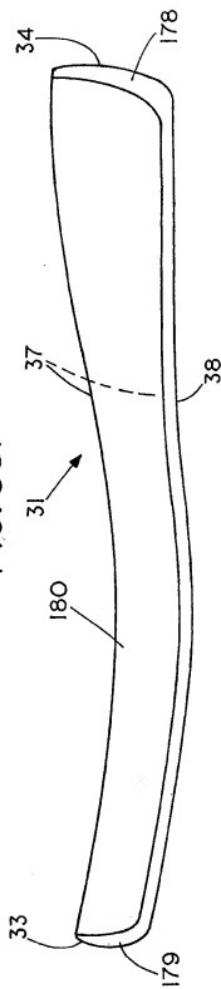
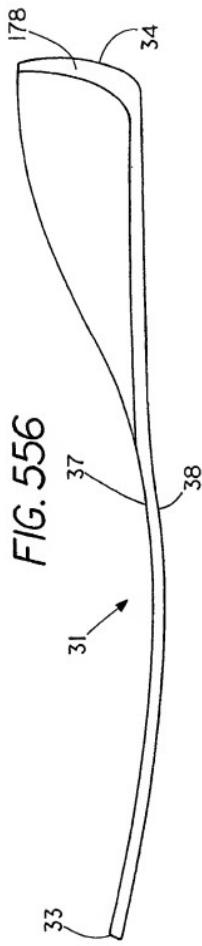


FIG. 558

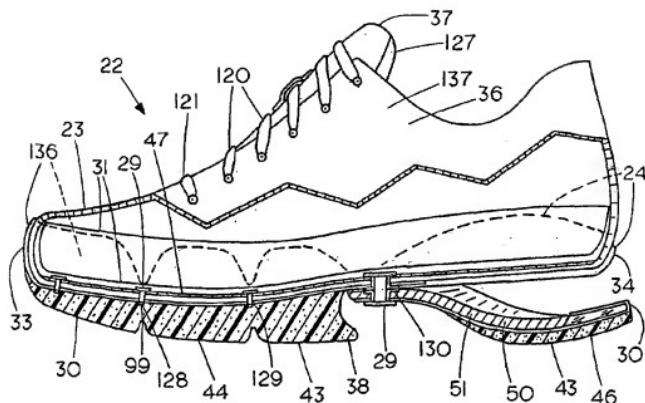
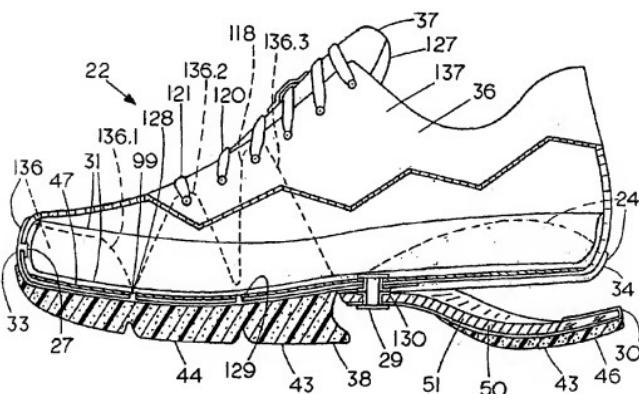


FIG. 559



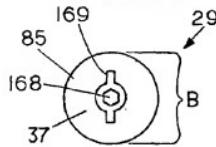
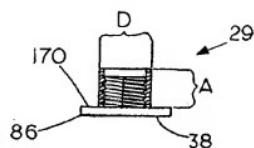
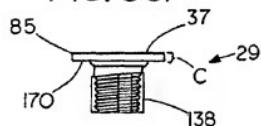
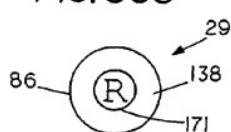
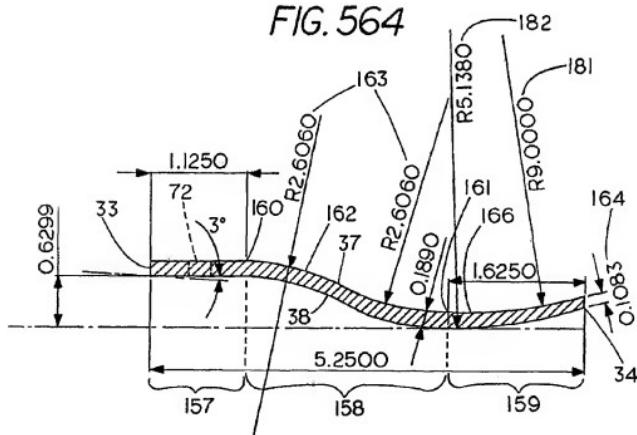
*FIG. 560**FIG. 562**FIG. 561**FIG. 563**FIG. 564*

FIG. 567

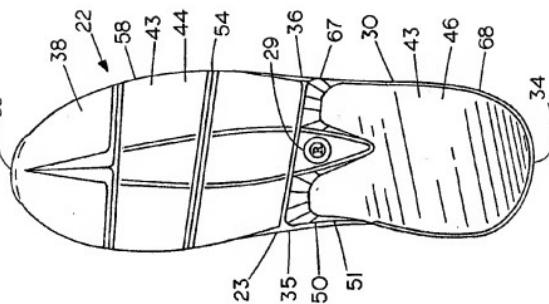


FIG. 566

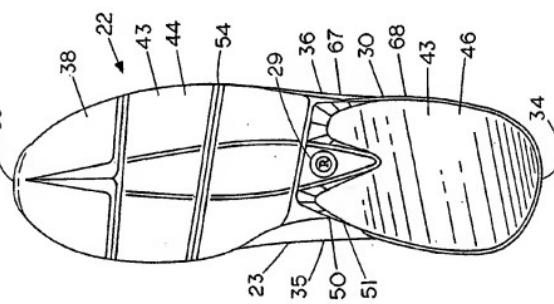


FIG. 565

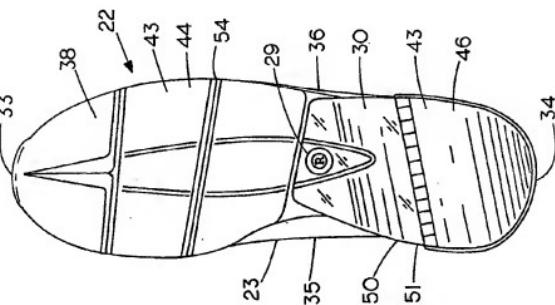


FIG. 568

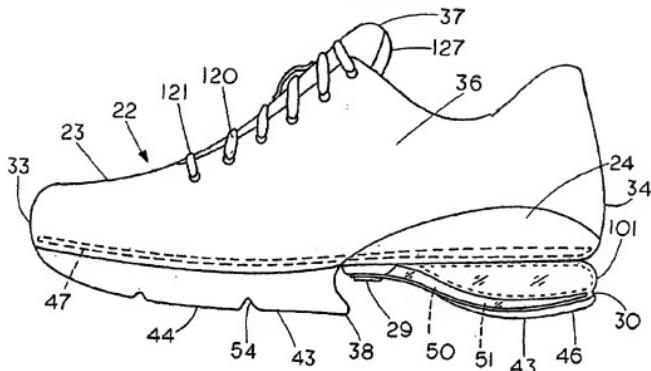


FIG. 569

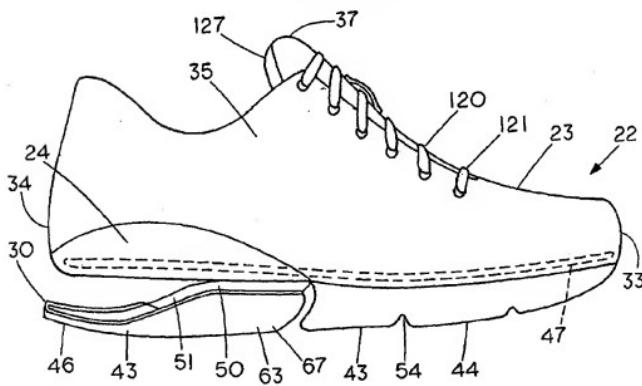


FIG. 570

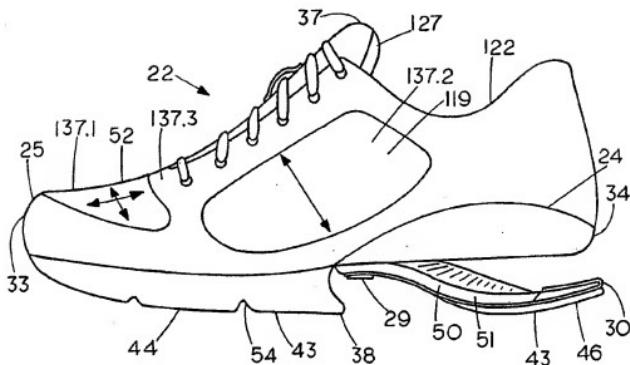


FIG. 571

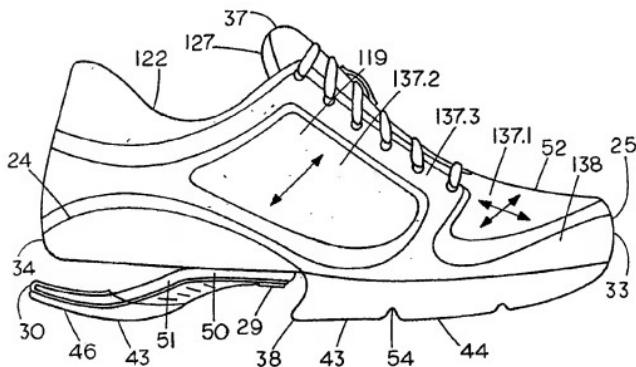
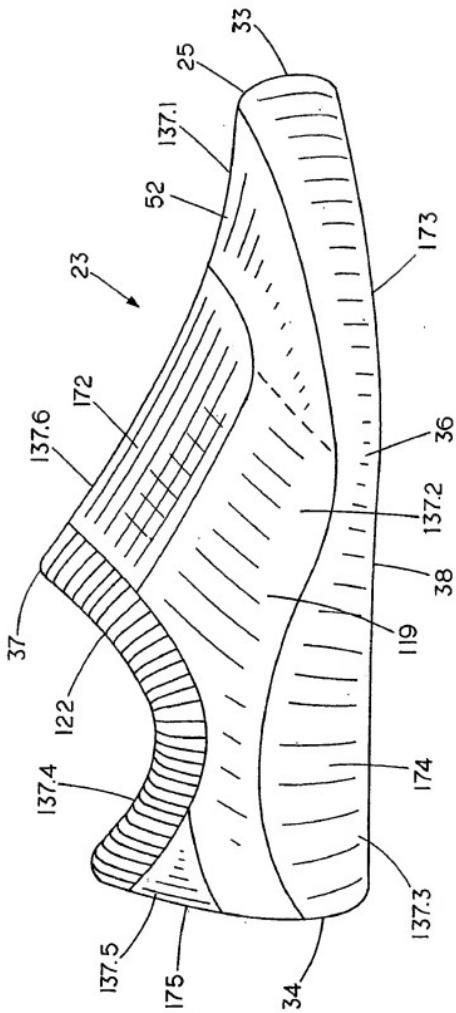


FIG. 572



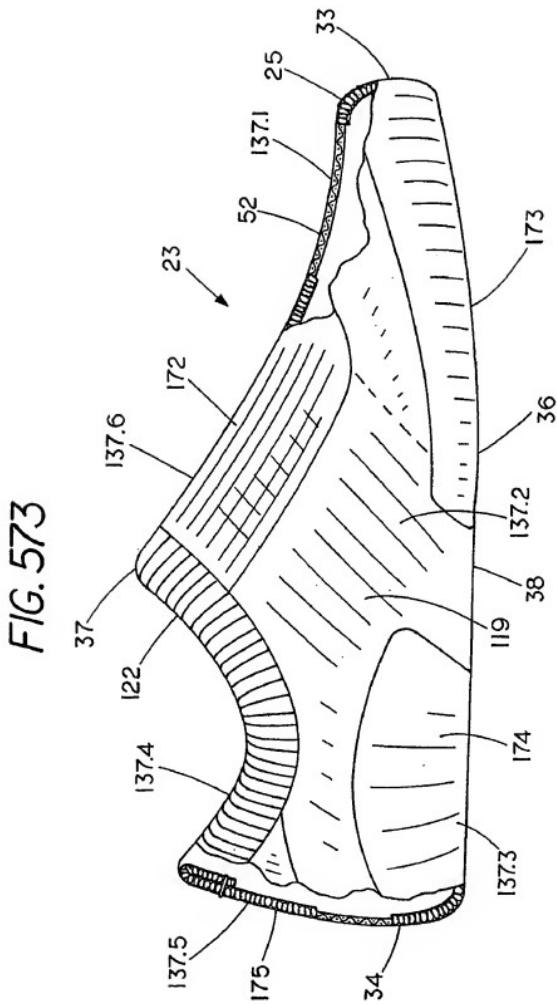


FIG. 574

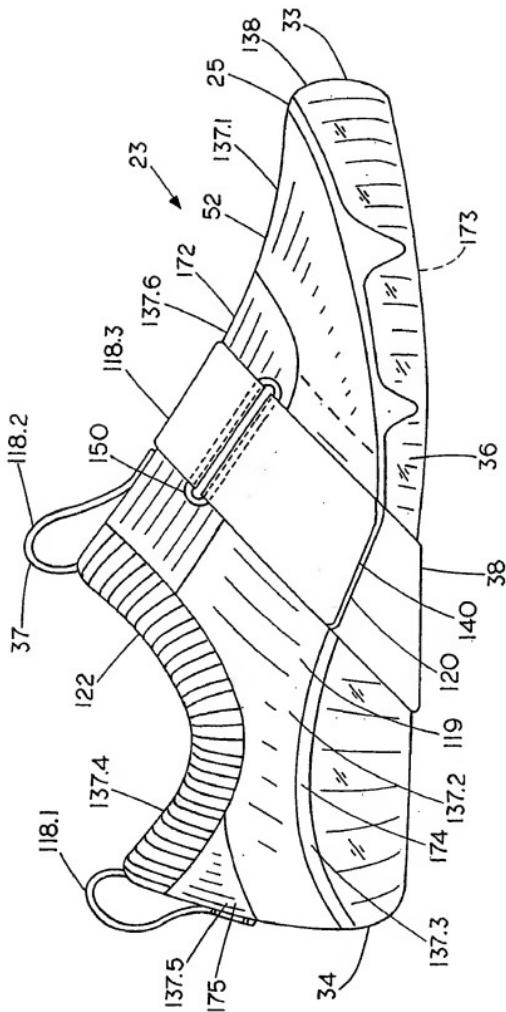
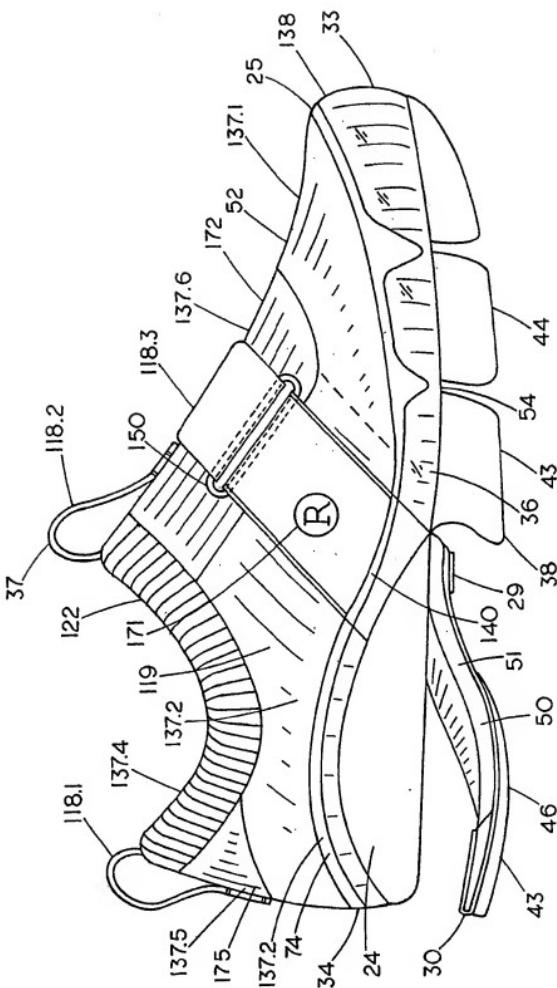


FIG. 575



**METHOD OF CONDUCTING BUSINESS  
INCLUDING MAKING AND SELLING A  
CUSTOM ARTICLE OF FOOTWEAR**

**CROSS REFERENCE TO RELATED  
APPLICATIONS**

The present Patent Application refers to and claims the benefit of priority under 35 U.S.C. 119(e) of each of the following U.S. Provisional Applications: Provisional Patent Application Ser. No. 60/360,784, filed on Mar. 1, 2002; Provisional Patent Application Ser. No. 60/345,951, filed on Dec. 29, 2001; and, Provisional Patent Application Ser. No. 60/292,644, filed on May 21, 2001. This Patent Application is a Continuation-In-Part of patent application Ser. No. 09/573,121, filed May 17, 2000, now U.S. Pat. No. 6,601,042 entitled "Customized Article of Footwear and Method of Conducting Retail and Internet Business." Further, the Present Application refers to and claims the benefit of priority under 35 U.S.C. 120 of each of the following Patent Applications: U.S. patent application Ser. No. 09/523,341, filed on Mar. 10, 2000, entitled "Article of Footwear Having a Spring Element and Selectively Removable Components," now U.S. Pat. No. 6,449,878; U.S. patent application Ser. No. 10/152,402, filed May 21, 2002, entitled "Customized Article of Footwear and Method of Conducting Retail and Internet Business;" International Patent Application PCT/US01/07484, filed on Mar. 8, 2001, entitled "Article of Footwear Having a Spring Element and Selectively Removable Components;" and, International Patent Application PCT/US01/16159 filed on May 17, 2001, entitled "Customized Article of Footwear and Method of Conducting Retail and Internet Business."

**FIELD OF THE INVENTION**

The present invention teaches an article of footwear including means for adjusting the length, width, girth, and foot shape. Further, the present invention teaches a customized article of footwear including a spring element, and selectively removable and replaceable components. Moreover, the present invention teaches a novel method of manufacturing articles of footwear, and also, a novel way of doing both retail and Internet business.

**BACKGROUND OF THE INVENTION**

The article of footwear taught in the present invention includes a spring element which can provide improved cushioning, stability, and running economy. Unlike the conventional foam materials presently being used by the footwear industry, a preferred spring element is not substantially subject to compression set degradation and can provide a relatively long service life. The components of the article of footwear including the upper, insole, spring element, and sole can be selected from a range of options, and can be easily removed and replaced, as desired. Further, the relative configuration and functional relationship as between the forefoot, midfoot and rearfoot areas of the article of footwear can be readily modified and adjusted. Accordingly, the article of footwear can be customized by an individual wearer or specifically configured for a select target population in order to optimize desired performance criteria. Moreover, the present invention teaches a novel method of manufacturing an article of footwear, and also, a novel way of doing both retail and Internet business.

Conventional athletic footwear typically include an outsole made of a thermoset rubber compound which is affixed

by adhesive to a midsole made of ethylene vinyl acetate or polyurethane foam material which is in turn affixed by adhesive to an upper which is constructed with the use of stitching and adhesives. Because of the difficulty, time, and expense associated with renewing any portion of conventional articles of footwear, the vast majority are generally discarded at the end of their service life. This service life can be characterized as having a short duration when a wearer frequently engages in athletic activity such as distance running or tennis. In tennis, portions of the outsole can be substantially abraded within a few hours, and in distance running the foam midsole can become compacted and degrade by taking a compression set within one hundred miles of use. The resulting deformation of the foam midsole can degrade cushioning and footwear stability, thus contribute to the origin of athletic injuries. Accordingly, many competitive distance runners who routinely cover one hundred miles in a week's time will discard their athletic footwear after logging three hundred miles in order to avoid possible injury.

Even though the service life of conventional athletic footwear is relatively short, the price of athletic footwear has steadily increased over the last three decades, and some models now bear retail prices over one hundred and twenty dollars. However, some of this increase in retail prices has been design and fashion driven as opposed to reflecting actual value added. In any case, conventional athletic footwear remain disposable commodities and few are being recycled. The method of manufacture and disposal of conventional athletic footwear is therefore relatively inefficient and not environmentally friendly. In contrast with conventional athletic footwear, the present invention teaches an article of footwear that includes spring elements which do not take a compression set or similarly degrade, thus the physical and mechanical properties afforded by a preferred article of footwear remain substantially the same over a useful service life which can be several times longer than that of conventional articles of footwear. The present invention teaches an article of footwear which represents an investment, as opposed to a disposable commodity. Like an automobile, the preferred article of footwear includes components which can be easily renewed and replaced, but also components which can be varied and customized, as desired.

Published examples of devices and means for selectively and removably affixing various components of an article of footwear include, e.g., U.S. Pat. No. 2,183,277, U.S. Pat. No. 2,200,080, U.S. Pat. No. 2,220,534, U.S. Pat. No. 2,552,943, U.S. Pat. No. 2,588,061, U.S. Pat. No. 2,640,283, U.S. Pat. No. 2,873,540, U.S. Pat. No. 3,012,340, U.S. Pat. No. 3,818,617, U.S. Pat. No. 3,878,626, U.S. Pat. No. 3,906,646, U.S. Pat. No. 3,982,336, U.S. Pat. No. 4,103,440, U.S. Pat. No. 4,107,857, U.S. Pat. No. 4,132,016, U.S. Pat. No. 4,262,434, U.S. Pat. No. 4,267,650, U.S. Pat. No. 4,279,083, U.S. Pat. No. 4,300,294, U.S. Pat. No. 4,317,294, U.S. Pat. No. 4,351,120, U.S. Pat. No. 4,377,042, U.S. Pat. No. 4,535,554, U.S. Pat. No. 4,606,139, U.S. Pat. No. 4,807,372, U.S. Pat. No. 4,887,369, U.S. Pat. No. 5,042,175, U.S. Pat. No. 5,083,385, U.S. Pat. No. 5,317,822, U.S. Pat. No. 5,339,544, U.S. Pat. No. 5,410,821, U.S. Pat. No. 5,533,280, U.S. Pat. No. 5,542,198, U.S. Pat. No. 5,615,497, U.S. Pat. No. 5,628,129, U.S. Pat. No. 5,644,857, U.S. Pat. No. 5,657,558, U.S. Pat. No. 5,661,915, U.S. Pat. No. 5,678,327, U.S. Pat. No. 5,692,319, U.S. Pat. No. 5,729,916, U.S. Pat. No. 5,826,352, U.S. Pat. No. 5,896,608, U.S. Pat. No. 6,151,805, U.S. Pat. No. 6,247,249 B1, U.S. Pat. No. 6,282,814 B1, U.S. Pat. No. 6,324,772 B1, U.S. Pat. No. 6,332,281 B1, U.S. Pat. No. 6,349,486 B1, and application

WO 02/13641 A1, all of these patents and patent applications hereby being incorporated by reference herein.

Conventional athletic footwear cannot be substantially customized for use by the consumer or wearer. The physical and mechanical properties of conventional athletic footwear are relatively fixed generic qualities. However, the body weight or mass and characteristic running technique of different individuals having the same footwear size can vary greatly. Often, the stiffness in compression of the foam material used in the midsole of athletic shoes can be too soft for individuals who employ more forceful movements, or who have greater body mass than an average wearer. Accordingly, conventional articles of athletic footwear do not provide optimal performance characteristics for individual wearers.

In contrast, the present invention permits a wearer to customize a preferred article of footwear. For example, the length, width, girth, and configuration of the upper, as provided by various last options, or by two or three dimensional modeling and footwear design equipment including computer software and data storage systems, or by two or three dimensional measurement devices such as scanners, as well as the type of footwear construction and design of the upper can be selected by the consumer or wearer. Further, the physical and mechanical properties of the article of footwear can be selected and changed as desired in order to optimize desired performance characteristics given various performance criteria or environmental conditions. For example, the configuration and geometry of the article of footwear, and the stiffness of the spring elements can be customized, as desired. In addition, the ability to easily remove, renew, and recycle the outsole portions of the preferred article of footwear can render the use of softer materials having enhanced shock and vibration dampening characteristics, but perhaps diminished wear properties, viable from a practical standpoint. Moreover, the outsole portion of the preferred article of footwear can be selected from a variety of options with regards to configuration, materials, and function.

The physical and mechanical properties associated with an article of footwear of the present invention can provide enhanced cushioning, stability, and running economy relative to conventional articles of footwear. The spring to dampening ratio of conventional articles of footwear is commonly in the range between 40-60 percent, whereas the preferred article of footwear can provide a higher spring to dampening ratio, thus greater mechanical efficiency and running economy. The preferred article of footwear can include an anterior spring element that underlies the forefoot area which can store energy during the latter portion of the stance phase and early portion of the propulsive phase of the running cycle, and then release this energy during the latter portion of the propulsive phase, thus facilitating improved running economy. It is believed the resulting improvement in running performance can approximate one second over four hundred meters, or two to three percent.

The preferred article of footwear can provide differential stiffness in the rearfoot area so as to reduce both the rate and magnitude of pronation; or alternately, the rate and magnitude of supination experienced by an individual wearer, thus avoid conditions which can be associated with injury. Likewise, the preferred article of footwear can provide differential stiffness in the midfoot and forefoot areas so as to reduce both the rate and magnitude of inward and/or outward rotation of the foot, thus avoid conditions which can be associated with injury. The preferred spring elements can also provide a stable platform which can prevent or reduce

the amount of deformation caused by point loads, thus avoid conditions which can be associated with injury.

Again, the viability of using relatively soft outsole materials having improved shock and vibration dampening characteristics can enhance cushioning effects. Further, in conventional articles of footwear, the shock and vibration generated during rearfoot impact is commonly transmitted most rapidly to a wearer through that portion of the outsole and midsole which has greatest stiffness, and normally, this is a portion of the sole proximate the heel of the wearer which undergoes the greatest deflection and deformation. However, in the present invention a void space exists beneath the heel of a wearer and the ground engaging portion of the outsole. Some of the shock and vibration generated during the rearfoot impact of an outsole with the ground support surface must then travel a greater distance through the outsole and inferior spring element in order to be transmitted to the superior spring element and a wearer. In addition, in the present invention, a posterior spacer which can serve as a shock and vibration isolator, and also vibration mitigation time modifiers can be used to decrease the magnitude of the shock and vibration transmitted to the wearer of a preferred article of footwear.

There are many published examples of attempts to introduce functional spring elements into articles of footwear, e.g., U.S. Pat. No. 357,062, U.S. Pat. No. 1,088,328, U.S. Pat. No. 1,107,894, U.S. Pat. No. 1,113,266, U.S. Pat. No. 1,352,865, U.S. Pat. No. 1,370,212, U.S. Pat. No. 2,444,865, U.S. Pat. No. 2,447,603, U.S. Pat. No. 2,456,102, U.S. Pat. No. 2,508,318, U.S. Pat. No. 3,333,553, U.S. Pat. No. 4,429,474, U.S. Pat. No. 4,492,046, U.S. Pat. No. 4,314,413, U.S. Pat. No. 4,486,964, U.S. Pat. No. 4,506,460, U.S. Pat. No. 4,566,206, U.S. Pat. No. 4,771,554, U.S. Pat. No. 4,854,057, U.S. Pat. No. 4,878,300, U.S. Pat. No. 4,942,677, U.S. Pat. No. 5,042,175, U.S. Pat. No. 5,052,130, U.S. Pat. No. 5,060,401, U.S. Pat. No. 5,138,776, U.S. Pat. No. 5,159,767, U.S. Pat. No. 5,203,095, U.S. Pat. No. 5,279,051, U.S. Pat. No. 5,337,492, U.S. Pat. No. 5,343,639, U.S. Pat. No. 5,353,523, U.S. Pat. No. 5,367,790, U.S. Pat. No. 5,381,608, U.S. Pat. No. 5,437,110, U.S. Pat. No. 5,461,800, U.S. Pat. No. 5,528,842, U.S. Pat. No. 5,596,819, U.S. Pat. No. 5,636,456, U.S. Pat. No. 5,647,145, U.S. Pat. No. 5,678,327, U.S. Pat. No. 5,701,686, U.S. Pat. No. 5,729,916, U.S. Pat. No. 5,822,886, U.S. Pat. No. 5,875,567, U.S. Pat. No. 5,937,544, U.S. Pat. No. 5,940,994, U.S. Pat. No. 6,029,374, U.S. Pat. No. 6,195,790, U.S. Pat. No. 6,247,249 B1, U.S. Pat. No. 6,282,814 B1, U.S. Pat. No. 6,327,795, U.S. Pat. No. 6,330,757, U.S. Pat. No. 6,324,772 B1, U.S. Pat. No. 6,393,731 B1, U.S. Pat. No. 6,416,610, French Patent 472,735, Italian Patent 633,409, European Patent Applications EP 0 890 321 A2, EP 1 048 233 A2, EP 1 033 087 A1, EP 1 025 770 A2, EP 1 240 838 A1, and PCT Patent Application WO 98/07341, all of these patents and patent applications hereby being incorporated by reference herein. Relatively few of these attempts have resulted in functional articles of footwear which have met with commercial success. The limitations of some of the prior art has concerned the difficulty of meeting the potentially competing criteria associated with cushioning and footwear stability. In other cases, the manufacturing costs of making prior art articles of footwear including spring elements have proved prohibitive. Articles of footwear including discrete foam cushioning elements which have been commercialized include the Nike "Shox," the Adidas "a3" which is believed to be taught in European Patent Application EP 1 240 838 A1, the Avia "ECS Cushioning" and Avia "ECS Stability," and also the Dada "SoleSonic Force."

The spring element and various other novel structures taught in the present invention can be used in a wide assortment of articles of footwear including but not limited to those used for running, walking, basketball, tennis, volleyball, cross-training, baseball, football, golf, soccer, cycling, sandals, hiking boots, and army boots. The present invention teaches an article of footwear which can provide a wearer with improved cushioning and stability, running economy, and an extended service life while reducing the risks of injury normally associated with footwear degradation. The preferred article of footwear provides a wearer with the ability to customize the fit, but also the physical and mechanical properties and performance of the article of footwear. Moreover, the preferred article of footwear is economical and environmentally friendly to both manufacture and recycle.

The present invention also teaches articles of footwear including means for adjusting the foot shape, length, width, and girth. For example, spring elements, anterior outsole elements, stability elements, and uppers having different configurations, and also alternate positions for selectively affixing various portions of an upper can be used to adjust and customize the fit of an article of footwear for an individual wearer. The upper can also include elastic or elongation means for adjusting the width, girth, and foot shape. The components of the article of footwear possibly including but not limited to the upper, insole, spring element, and sole can be selected from a range of options, and can be easily removed and replaced, as desired. Further, the relative configuration and functional relationship as between the forefoot, midfoot and rearfoot areas of the article of footwear can be readily modified and adjusted. Accordingly, the article of footwear can be configured and customized for a wearer or a select target population in order to optimize performance criteria, as desired.

Moreover, the present invention teaches a novel method of manufacturing articles of footwear, and also, a novel way of doing both retail and Internet business. For example, the anatomical features, configuration, and dimensions of a given wearer's foot and any other special needs, requirements, or preferences can be recorded by direct communication, observation, and measurement in a retail or medical setting, or alternately, by a wearer or other individual within their home or other remote site, and this data can be used to generate information and intelligence relating to the manufacture of a custom article of footwear. Conventional measuring or reproduction means such as rulers, measuring tapes, Brannock devices, two or three dimensional scanners, pressure sensors, infrared thermography, stereolithography, photographs, photocopies, FAX, e-mail, cameras, images, tracings, video, television, computers and computer screens, software, data storage and retrieval systems, templates, molds, models, and patterns can be used to help determine and make selections relating to an individual's foot shape, length, width, girth, and the like.

Teachings which have been published or that otherwise constitute public information regarding the conduct of Internet or retail business include: U.S. Pat. No. 5,897,622 granted to Blum et al.; U.S. Pat. No. 5,930,761 granted to Rose; U.S. Pat. No. 5,983,200 granted to Slotnick; U.S. Pat. No. 5,983,201 granted to Fay; U.S. Pat. No. 6,206,750 B1 granted to Barad et al.; U.S. Pat. No. 5,206,804 granted to Theis et al.; PCT patent application WO 98/18386 by Rami; the press release by Nike, Inc. dated Nov. 22, 1999 and the Internet website [www.nike.com](http://www.nike.com), and in particular, the section associated with the Nike iD program; the Internet website [www.custommixx.com](http://www.custommixx.com); the Internet website [www.adidas.com](http://www.adidas.com); and in particular, click on "products," then click on "mass customization," and see everything related to the "MI Adidas" initiative; the Internet website [www.copycats.com](http://www.copycats.com); the publication in the Oakland Tribune on Dec. 18, 1996 relating to the Internet Mall website; and, the article by Tim Wilson entitled "Custom Manufacturing—Nike Model Shows Web's Limitations," Internetweek; Manhasset; Dec. 6, 1999, Issue 792. All of the patents and patent applications recited in this paragraph being hereby incorporated by reference herein.

Given the provision of an adequate and ready stock of the various components anticipated for use in making the preferred articles of footwear, and the information and intelligence created from the data relating to an individual wearer or target population, a worker and/or automated system can assemble or manufacture a customized article of footwear within five minutes. In fact, it is possible to assemble a selected and customized article of footwear according to the present invention in less than one minute using a single fastener. This can be accomplished at the point of purchase or service center which can be located in a retail or medical facility, or alternatively, at a remote manufacturing environment. Accordingly, similar to the rapid delivery eyewear service centers and retail stores which presently exist, a consumer can now also be provided with a custom article of footwear within minutes. Alternately, if and when an individual's data is received from a remote site at the Website or other address of a company which practices the present invention, and then transmitted to a manufacturing or assembly center, a custom article of footwear can be made and possibly delivered to an individual's home or other designated address by same day or overnight service, as desired.

#### SUMMARY OF THE INVENTION

The present invention teaches a method of conducting retail and Internet business including making and delivering a custom article of footwear. The article of footwear disclosed in the present invention includes a spring element that can provide improved cushioning, stability, and running economy. Unlike the conventional foam materials presently being used by the footwear industry, a preferred spring element is not substantially subject to compression set degradation and can provide a relatively long service life. The components of the article of footwear including the upper, insole, heel counter, spring element, and sole can be selected from a range of options, and can be easily removed and replaced, as desired. Accordingly, the present invention also discloses a method of making a custom article of footwear.

A preferred article of footwear can include an anterior side, a posterior side, a medial side, a lateral side, a longitudinal axis, a transverse axis, an upper, a sole, at least one fastener, and a spring element comprising a superior spring element and an inferior spring element. The superior spring element can extend substantially between the posterior side and the anterior side of the article of footwear and be substantially positioned within the upper in order to secure the upper to the superior spring element. The inferior spring element and the sole can be substantially positioned inferentially and externally with respect to the upper, and the superior spring element can be affixed in functional relation to the inferior spring element by at least one fastener. The article of footwear can further include an upper having a plurality of openings on the inferior side in the forefoot area. Further, an anterior outsole element including a backing can be at least partially positioned within the upper. However,

the substantial portion of the anterior outsole element including the ground engaging portion and a plurality of traction members can project through the openings in the upper, thus the substantial portion of the anterior outsole element can nevertheless be substantially positioned inferiorly and externally relative to the upper. In an alternate embodiment, the article of footwear can further include an upper having a plurality of openings on the inferior side, but also on a portion of the medial side, lateral side, and anterior side in the forefoot area, and the anterior outsole element can then include a backing having an elevated profile and traction members that extend upwards about a portion of the medial side, lateral side, and anterior side of the upper.

The article of footwear can possibly further include an insole, a stability element, a sole including an anterior outsole element, a middle outsole element, and a posterior outsole element having a backing, and also closure means such as an elastic upper, shoe laces, a strap including VELCRO® hook and pile, or a strap including openings and eyelets for receiving conventional shoe laces. A strap can encompass the medial side, lateral side, inferior side, and superior side of the upper, and an alternate embodiment of a strap can also include a portion that encompasses the posterior side of the upper. In any case, a strap can be selectively removable and replaceable. In an alternate embodiment, the upper can be over-lasting, that is, over-sized in order to accommodate a removable and replaceable midsole cushioning element which can be inserted into the forefoot area between the insole and the upper.

The insole can include an elevated profile about the medial side, lateral side, anterior side, and posterior side for protecting a wearer's foot from contact with an elevated portion of an anterior outsole element, stability element, side support, or heel counter. The insole can include a heel pad, toe pad, bottom, and side portions having different thickness for selectively adjusting the effective length and width of the article of footwear. The inferior side of the upper can include an opening in the rearfoot area for positioning a removable and replaceable cushioning element such as a fluid-filled bladder or a resilient foam material. The superior side of an insole can then include a window in the rearfoot area for viewing a removable and replaceable cushioning element such as a fluid-filled bladder or a resilient foam material. A fluid-filled bladder can be positioned between a superior spring element, posterior spring element, or external heel counter and the inferior spring element.

The inferior spring element can be affixed in functional relation to the superior spring element and can project rearward and downward therefrom forming a V-shape. The superior spring element can further include an anterior spring element and a posterior spring element affixed together in functional relation, and the inferior spring element can be affixed in functional relation to the posterior spring element. The anterior spring element and posterior spring element can be affixed together in an overlapping relationship. The anterior spring element can further include a projection, and the posterior spring element can include a recess for accommodating the anterior spring element. The superior spring element can have a configuration generally corresponding to the bottom net of the last of an article of footwear and can either be generally planar, or curved. At least a portion of the superior spring element can be curved to mate with the anatomy of a wearer. Further, a superior spring element can possibly also include a side stabilizer or a heel counter. The heel counter can be integral to the superior spring element, or alternately be a separate component. The upper can be trapped and secured in functional

relation between an external heel counter and an overlaying superior spring element. An advantageous thickness for an external heel counter for a wearer having a given body weight can be approximately 2.0 mm for a wearer having a body weight in the range between 100–140 pounds; 2.5 mm for a body weight in the range between 140–180 pounds, and 3.0 mm for a body weight in the range between 180–220 pounds. An anterior spring element can have a curved shape and incorporate toe spring. The amount of toe spring incorporated in an anterior spring element can be in the range between 0–40 mm, and in particular, in the range between 10–30 mm. A substantial portion of the anterior spring element can extend anterior of 50 percent of the length of the upper as measured from the posterior side of the upper, whereas a substantial portion of the inferior spring element can extend within 50 percent of the length of the upper as measured from the posterior side of the upper.

The inferior spring element can include a longitudinal axis, a transverse axis, and a flexural axis. The flexural axis can be consistent with the transverse axis. An inferior spring element including a flexural axis consistent with the transverse axis can have a symmetrical configuration on both the medial side and lateral side. Alternately, an inferior spring element including a flexural axis consistent with the transverse axis can have an asymmetrical configuration, and can have greater concavity downwards adjacent the transverse axis on the medial side than on the lateral side. Alternately, the inferior spring element can include a flexural axis deviated from the transverse axis in the range between 10–50 degrees. In particular, given an average individual wearer who would be characterized as a rearfoot striker, it can be advantageous for the flexural axis to be deviated from the transverse axis in the range between 20–30 degrees in footwear intended for walking or running. Accordingly, the length of the effective lever arm on the medial side of the inferior spring element will be shorter than that on the lateral side, that is, as measured between the posterior side of the inferior spring element and the location of the flexural axis on each respective side. One way of expressing the length differential of the effective lever arms of the inferior spring element on the medial side versus the lateral side is with a ratio. In this regard, it can be advantageous for effecting rearfoot stability that the ratio of the length of the effective lever arms on the lateral side relative to those on the medial side be in the range between 1/1 to 2/1, and in particular, in the range between 1.25/1 to 1.75/1.

Further, in a men's size 9 article of footwear, the posteriormost position of the flexural axis on the medial side can be in the range between 1–6 inches from the posterior side of the upper, and in particular, in the range between 2–4 inches from the posterior side of the upper. An inferior spring element including a flexural axis deviated from the transverse axis can have a symmetrical configuration on both the medial side and lateral side. Alternately, an inferior spring element including a flexural axis deviated from the transverse axis can have an asymmetrical configuration, and can have greater concavity downwards adjacent the transverse axis on the medial side than on the lateral side. Whether the flexural axis is consistent with the transverse axis or is deviated therefrom, an inferior spring element having a symmetrical configuration on the medial side and lateral side can include an anterior portion extending between its anterior side and an anterior tangent point, a middle portion including an anterior curve extending between the anterior tangent point and a posterior tangent point, and a posterior portion extending between the poste-

rior tangent point and the posterior side of said inferior spring element. It can be advantageous that the anterior curve be configured to have a fitted symmetrical radius of curvature. Moreover, the posterior portion of the inferior spring element can be inclined, or include a posterior curve.

The inferior spring element can attain maximum separation from the superior spring element at a position anterior of the posterior side of the inferior spring element, and can substantially maintain the maximum separation between that position and the posterior side of the inferior spring element. Alternately, the inferior spring element can attain maximum separation from the superior spring element at a position anterior of the posterior side of the inferior spring element, and the separation can then be decreased between that position and the posterior side of the inferior spring element. The inferior spring element can be concave downwards near the anterior side of the inferior spring element, but can be concave upwards or convex near the posterior side of the inferior spring element. The inferior spring element can be made in a laminate configuration or structure. The inferior spring element can be made in a tapered configuration or structure. An inferior spring element can exhibit less stiffness in compression on the lateral side relative to the medial side, and it can be advantageous for walking and running activity that the differential stiffness be in the range between two-to-three to one.

The spring element can be made of a fiber composite material, and an unidirectional carbon fiber composite material including a toughened epoxy can be preferred for use. Alternately, the spring element can be made of a metal material such as spring steel or titanium. The spring element is preferably made of a material having spring characteristics such that the material is capable of storing and returning at least 70 percent of the mechanical energy imparted thereto. In this regard, a preferred fiber composite material, or alternately, a metal material such as spring steel or spring grade titanium is capable of storing and returning at least 90 percent of the energy imparted thereto when their mechanical characteristics are measured using test method ASTM 790.

The superior spring element can have a thickness in the range between 0.5–10.0 mm. The superior spring element can include an anterior spring element or forefoot area having a thickness in the range between 0.5–2.5 mm, and in particular, in the range between 1.0–1.75 mm. The superior spring element can also include a posterior spring element having a thickness in the range between 1–10 mm. When the superior spring element, or posterior spring element has a three dimensional shape in the rearfoot area including an integral heel counter or side counters, the superior spring element or posterior spring element can generally have a thickness in the range between 1–5 mm. Further, a spring element can include areas having different thickness, notches, slits, or openings which can serve to produce differential stiffness characteristics when the spring element is loaded. In this regard, the superior spring element or anterior spring element in the forefoot area can include at least one longitudinal notch or slit, and also a plurality of transverse notches or slits on the medial side and lateral side for influencing the flexural modulus and torsional characteristics in a desired manner. It can sometimes be advantageous for the transverse notches or slits on the lateral side to extend for a greater distance relative to those present on the medial side, and also for a pair of opposing notches or slits on the medial side and lateral side to approximately correspond the position of the metatarsal-phalangeal joints, that is, be positioned between 60–70 percent of the length of the

upper as measured from the posterior side. The spring element can include different types, orientations, configurations, and numbers of fiber composite layers in different areas in order to achieve differential stiffness when the spring element is loaded. Accordingly, the flexural modulus or stiffness exhibited by a spring element in the rearfoot area, midfoot area, forefoot area, and also that exhibited about any axis can be engineered, as desired. In this regard, it can be advantageous to create a region of reduced stiffness, that is, a forefoot strike zone, on the lateral side in the area approximately corresponding to the location of a wearer's metatarsal-phalangeal joints.

The inferior spring element can provide deflection in the range between 5–50 mm. For example, deflection approximately in the range between 8–15 mm could be selected by some wearers for a training shoe intended for use in running at a relatively fast pace, a racing flat, or a track spike. Alternately, deflection approximately in the range between 15–50 mm could be selected by some wearers for a training shoe intended for use in running at a relatively slow pace. The inferior spring element can have a thickness in the range between 3–10 mm. The superior spring element can have a thickness in the range between 0.5–10.0 mm. The superior spring element can include a forefoot area or anterior spring element having a thickness in the range between 0.5–2.5 mm, and in particular, in the range between 1.0–1.75 mm. Generally, regarding a men's size 9 article of footwear, an advantageous overall length of an inferior spring element for running is in the range between 4.75 and 5.5 inches, the width in the range between 75–85 mm, the vertical elevation is in the range between 10–18 mm, and the thickness is in the range between 4–5.5 mm at the anterior side 33 and in the range between approximately 2–3 mm at the posterior side. Generally, an advantageous fitted symmetrical radius of curvature for use in a men's size 9 running shoe with respect to the anterior curve is in the range between 2.25 and 3.25 inches, an advantageous radius of curvature with respect to the superior side of the posterior curve is in the range between 7 and 11 inches, and an advantageous radius of curvature regarding the inferior side of the posterior portion is in the range between 4–6 inches. When no other means are being used to create differential stiffness between the medial and lateral sides of an article of footwear which is intended for use in running, given an inferior spring element having the configuration shown, it is generally advantageous for the flexural axis to be deviated from the transverse axis in the range between 20–30 degrees. In particular, an inferior spring element for possible use with a men's size 9 article of footwear can have an overall length of 5.25 inches, and the anterior portion can measure 1.125 inches, the middle portion can measure 2.5 inches, and the posterior portion can measure 1.625 inches. Alternately, the overall length can be reduced by 0.25 inch by subtracting 0.125 inches from both the anterior portion and the posterior portion. Further, the inferior spring element can have a maximum width in the range between 75–80 mm, and the flexural axis can be deviated from the transverse axis in the range between 20–30 degrees. The anterior portion of the inferior spring element can also project downwards at a three degree angle towards the anterior side. This can facilitate attaining an advantageous geometry and fit with respect to a superior spring element and also an external heel counter. The fitted symmetrical radius of curvature of the anterior curve can have a radius of 2.606 inches, whereas the radius of curvature of the superior side of the posterior curve can be 9.0 inches, and the radius of curvature corresponding to the tapering of the inferior side of the posterior portion

can be 5.138 inches. The vertical elevation of the inferior spring element can be 0.6299 inches or 16 mm, and the thickness of an inferior spring element for a wearer having a body weight of approximately 140–160 pounds can be 0.189 inches or 4.8 mm at the anterior side and tapering to only 0.1083 inches or 2.75 mm at the posterior side. If and when desired, the vertical elevation can be changed in the range between 10–18 mm, something that would also cause the fitted symmetrical radius of curvature associated with the anterior curve to also change, but otherwise merely changing the vertical elevation need not substantially change the other dimensions and configuration. The thickness and tapered configuration of the inferior spring element can be varied for use by individuals having different body weight, running technique, or characteristic running speeds, and also for use in many different activities. Given an inferior spring element having the dimensions recited in this paragraph, the following general guidelines regarding the desired thickness for a wearer could apply: a maximum thickness of 4.0 mm for a wearer having a body weight in the range between 100–120 pounds; 4.25 mm for a wearer in the range between 120–140 pounds; 4.5 mm for a wearer in the range between 140–160 pounds; 4.75 mm for a wearer in the range between 160–180 pounds; 5.0 mm for a wearer in the range between 180–200 pounds; and 5.25 mm for a wearer in the range between 200–220 pounds.

The article of footwear can further include a posterior spacer between the superior spring element or posterior spring element and the inferior spring element. Further, an anterior spacer can be used between a superior spring element and an anterior spring element, or alternately between an anterior spring element and an inferior anterior spring element. An anterior spacer or posterior spacer can also possibly be positioned between the anterior spring element and the posterior spring element. An anterior spacer and a posterior spacer can have a wedge or sloped shape. An anterior spacer can have a gently rounded shape near the posterior side. The shape of a posterior spacer and an anterior spacer can be used to modify the configuration and performance of a spring element and that of an associated article of footwear.

In an alternate embodiment of an article of footwear, the superior spring element can extend substantially between the posterior side and anterior side of the upper. Again the superior spring element can consist of a posterior spring element and an anterior spring element configured in an overlapping relationship. The inferior spring element can be affixed in functional relation to the superior spring element or posterior spring element, thus form a spring element having a v-shape in the rearfoot area. Further, an inferior anterior spring element can be positioned and affixed in function relation to an anterior spacer and the superior spring element or anterior spring element, thus forming a spring element having a v-shape in the forefoot area as well. The inferior anterior spring element can include at least one longitudinal notch or slit, and also at least one transverse notch or slit for influencing the flexural and torsional characteristics in a desired manner. Again, with preferably at least seventy-five percent, and most preferably substantially all of the other major components of the article of footwear, the inferior anterior spring element, anterior spacer, and anterior outsole element can be selectively removed and replaced, as desired.

Cushioning elements such as fluid-filled bladders or foam materials can be formed or affixed to the backing portion of the anterior outsole element, and also to the backing portion of the posterior outsole element. Alternately, a cushioning

element can include a web portion, backing portion, or flange, and the cushioning element can be inserted into a pocket in the anterior outsole element or the posterior outsole element and a substantial portion of the cushioning element can then project through an opening in the backing portion of the respective outsole element. Accordingly, the cushioning element can be affixed in position, but the cushioning element can nevertheless be selectively removable and replaceable. Again, a fluid-filled bladder can be positioned between the superior spring element or posterior spring element and the inferior spring element. Further, a fluid-filled bladder can also be positioned on the inferior side of the inferior spring element. In addition, a fluid-filled bladder positioned between the superior spring element or posterior spring element and the inferior spring element including at least one chamber can be in fluid communication with another chamber or fluid filled bladder positioned on the inferior side of the inferior spring element. Fluid-filled bladders including valves that can also serve as a motion control device can be used. Moreover, fluid-filled bladders that form part of a larger dynamically-controlled cushioning system can be used. Such an article of footwear can include at least one fluid-filled bladder including a plurality of chambers, a control system possibly including a CPU, a pressure detector, and a regulator for modulating the level of fluid communication between different fluid-filled bladders or chambers.

The sole can consist of a single component, or alternately can consist of a two part component including an anterior outsole element and a posterior outsole element, or alternately can consist of a three part component including an anterior outsole element, a middle outsole element, and a posterior outsole element. The anterior outsole element can be affixed in functional relation to the superior spring element, or anterior spring element. The anterior outsole element can include an undercut portion for mating with openings in the upper, thus providing a snap fit with the upper. The posterior outsole element and the middle outsole element can be affixed to the inferior spring element, and thereby be affixed in functional relation to the superior spring element. The sole can include a midsole and an outsole, or merely an outsole. The sole can also include an outsole having a backing, a tread or ground engaging surface, traction members, a rocker configuration, and lines of flexion, whether in partial or complete combination. The sole can include a bicycle cleat, or traction members suitable for use on natural or artificial turf. The anterior outsole element can have a generally planar configuration, or alternately, a three dimensional wrap configuration. The anterior outsole element can be made in different length sizes, width sizes, and last or foot shapes, as desired. The backing portion of the anterior outsole element can include an elevated profile and thereby substantially define the shape of the upper in the forefoot area. Further, the backing portion of the anterior outsole element can be molded and cut to a desired length, width, girth and footshape, as desired. The backing portion of an anterior spring element can be substantially positioned in the forefoot area, or alternately, can substantially extend full length. A gasket can be used to seal the junction between the anterior outsole element and the upper. The sole can further include a cushioning element such as a fluid-filled bladder, or a foam material. A cushioning element can be affixed in functional relation to the backing portion of an outsole element. Alternately, a cushioning element can include a web portion, backing portion, or flange, and the cushioning element can be inserted into a pocket in the outsole element and a substantial portion of the

cushioning element can project through a opening in the backing portion of the outsole element. Accordingly, the cushioning element can be affixed in position, but the cushioning element can nevertheless be selectively removable and replaceable. A middle outsole element can be made of at least one fluid-filled bladder, or alternately be made of a resilient foam material. In a bottom plan view, a middle outsole element can have a generally triangular shape. A cushioning element can be positioned on the medial side in order to create a differential cushioning and stability effect. In an alternate embodiment, the sole can be affixed in functional relation to the exterior of the upper. The anterior outsole element can include male mating structures for mating with female mating structures on the superior spring element. Again, the sole can be selectively removable and replaceable, and can be made with a multiplicity of alternate configurations and materials which are particularly suitable for use given specific environmental conditions and performance tasks.

The upper can further include a sleeve for affixing at least a portion of the superior spring element in function relation thereto. The upper can be substantially made using a single piece of textile material that can be cut by an automatic cutting machine, and stitched using an automatic three dimensional sewing machine. Alternately, the upper can be substantially made of a molded plastic material. Alternately, the upper can be substantially made of a circular knitted and/or three dimensional textile material, or woven textile material. Further, an upper substantially made of a circular knitted and/or three-dimensional textile material, or woven textile material can be over-molded with a plastic material, or otherwise include an plastic material reinforcement affixed thereto.

The components of the article of footwear including the upper, insole, superior spring element possibly including an anterior spring element and a posterior spring element, heel counter, inferior spring element, sole including an anterior outsole element and a posterior outsole element having a backing, and at least one fastener can be selectively removable and replaceable. A fastener can include a male part and a female part, and can further include a geometric shape such as a square, triangular, pentagon, hexagon, or other shape which can substantially prevent the rotation of various components of a spring element relative to one another. A fastener can include spines on the mating surfaces of corresponding male and female parts for permitting the selective adjustment of the angular orientation or deviation of the inferior spring element with reference to the longitudinal axis. A fastener can include locking means such as a plastic material whereby the male part and female part cannot be accidentally loosened.

The article of footwear can further include a spring guard for protecting the posterior aspect of the mating portions of the superior spring element or posterior spring element and the inferior spring element. The article of footwear can further include a vibration decay time modifier. The vibration decay time modifiers can include a head and a stem. The head of the vibration decay time modifiers can be dimensioned and configured for vibration substantially free of contact with the base of the posterior spacer or spring element in directions which substantially encompass a 360 degree arc and normal to the longitudinal axis of the stem.

In an alternate embodiment of an article of footwear, the spring element can consist of a superior spring element which can include an anterior spring element and a posterior spring element affixed together in functional relation, but not include an inferior spring element projecting rearward and

downward therefrom. In an alternate embodiment, the anterior spring element can include a medial anterior spring element and a lateral anterior spring element that are removably affixed in functional relation to the posterior spring element. In an alternate embodiment, the anterior spring element and inferior spring element can consist of a single component, or alternately, can be affixed together in functional relation, and the posterior spring element can be affixed in functional relation thereto. An alternate article of footwear can have an anterior side, a posterior side, a medial side, a lateral side, a superior side, an inferior side, a longitudinal axis, a transverse axis, and a plurality of fasteners. The upper can include a plurality of alternate openings on the inferior side at a plurality of different positions, and the alternate openings can be offset by a distance corresponding to a change in one standard width size and configured for receiving the plurality of fasteners. Spring elements can be made in different configurations for accommodating different length sizes, width sizes, and also different last or foot shapes. A spring element can have a plurality of openings, or alternately, can have notches or slits for accommodating a plurality of fasteners, and the spring element can be positioned within the upper. The upper can then be removably affixed in functional relation to the spring element by the plurality of fasteners, as desired.

An article of footwear can have an anterior side, a posterior side, a medial side, a lateral side, a superior side, an inferior side, a longitudinal axis, and a transverse axis. The article of footwear can include an upper including a plurality of openings on the inferior side, an insole, a heel counter, a fastener, and a sole including an anterior outsole element and a posterior outsole element. The anterior outsole element can be positioned in functional relation within the upper and can include a plurality of traction members. The traction members can substantially project through the openings on the inferior side of the upper. The article of footwear can include a spring element including a superior spring element and an inferior spring element, and the superior spring element can extend substantially between the posterior side and the anterior side of the article of footwear and be substantially positioned in functional relation within the upper to secure the upper to the superior spring element. The inferior spring element can be substantially positioned inferiorly and externally with respect to the upper. The posterior outsole element can be affixed in function relation to the inferior spring element and the superior spring element by a fastener. The upper, insole, heel counter, superior spring element, inferior spring element, anterior outsole element, posterior outsole element, and fastener can be selectively removable and replaceable. The article of footwear can further include a stability element, a sole including an anterior outsole element, a middle outsole element, and a posterior outsole element having a backing, a midsole cushioning element such as a fluid-filled bladder or a resilient foam material, and closure means such as an elastic upper, shoe laces, a strap including VELCRO® hook and pile, or a strap including openings and eyelets for receiving conventional shoe laces.

The present invention teaches a method of making a custom article of footwear comprising the steps of:

- Collecting data relating to an individual, and said individual's preferences, and anatomical features and measurements of said individual's foot;
- Creating from said collected data information and intelligence for making said custom article of footwear for said individual;

- c) Providing said information and intelligence to a physical location at which said custom article of footwear can be made;
- d) Providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, and including at least one fastening component;
- e) Selecting from said plurality of footwear components sufficient footwear components for making said custom article of footwear and selecting said at least one fastening component;
- f) Removably securing a plurality of said selected sufficient footwear components in functional relation with said at least one fastening component to complete the making of said custom article of footwear.

The present invention teaches a method of conducting business including making and delivering a custom article of footwear comprising the steps of:

- a) Collecting data relating to an individual, and said individual's preferences, and anatomical features and measurements of said individual's foot;
- b) Creating from said collected data information and intelligence for making said custom article of footwear for said individual;
- c) Providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, and including at least one fastening component;
- d) Selecting from said plurality of footwear components sufficient footwear components for making said custom article of footwear and selecting said at least one fastening component;
- e) Providing said information and intelligence further comprising said selections to a physical location at which said custom article of footwear can be made;
- f) Removably securing a plurality of said selected sufficient footwear components in functional relation with said at least one fastening component to complete the making of said custom article of footwear; and,
- g) Causing said custom article of footwear to be delivered to a designated address.

The information and intelligence can be provided to a physical location comprising a retail store. The assembly for making of the custom article of footwear can be completed thereafter, and the step of causing delivery of the custom article of footwear to a designated address can comprise delivery of the custom article of footwear at the retail store directly to the individual. The assembly for making of the custom article of footwear and delivery directly to the individual can then be completed in less than five minutes, and perhaps even in less than one minute. The collecting step can comprise transmitting the data relating to an individual, and the individual's preferences, and the anatomical features and measurements of the individual's foot by electronic means to a remote physical location, and the aforementioned steps b, c, d, e, f, and g can be completed within a selected number of working days. If desired, the aforementioned steps b, c, d, e, f, and g can be completed within one working day. The collecting step can comprise transmitting the data relating to an individual, and the individual's preferences, and the anatomical features and measurements of the individual's foot over a global communication network, and the aforementioned steps b, c, d, e, f, and g can be completed within a selected number of working days. If desired, the aforementioned steps b, c, d, e, f, and g can be completed within one working day. The aforementioned global communication network can comprise the Internet. The remote

physical location can comprise a site selected from the group consisting of a company headquarters, a factory, a warehouse and distribution center, a sales office, a medical office, and a retail store. At least a portion of the data relating to an individual, and the individual's preferences, and the anatomical features and measurements of the individual's foot, and also at least a portion of the information and intelligence for making the custom article of footwear for the individual can be stored in a data storage and retrieval system for present and future use.

The custom article of footwear can include an anterior side, a posterior side, a medial side, a lateral side, a longitudinal axis, and a transverse axis, and the sufficient footwear components can comprise an upper, cushioning means, a sole, and said at least one fastening component. The custom article of footwear can include an anterior side, a posterior side, a medial side, a lateral side, a longitudinal axis, and a transverse axis, and the sufficient footwear components can comprise an upper, closure means, a heel counter, an insole, a sole comprising an anterior outsole element and a posterior outsole element, a superior spring element, an inferior spring element, and said at least one fastening component. At least seventy-five percent of the sufficient footwear components for making an article of footwear comprising an upper, closure means, a heel counter, an insole, a sole comprising an anterior outsole element and a posterior outsole element, a superior spring element, an inferior spring element, and at least one fastening component can be selectively removable and replaceable.

The superior spring element can be capable of extending substantially between the posterior side and the anterior side of the upper and be capable of being substantially positioned within the upper to secure the upper to the superior spring element, the heel counter being capable of being positioned externally with respect to the upper, the inferior spring element being capable of being substantially positioned inferiorly and externally with respect to the upper and the heel counter, the inferior spring element being capable of being affixed in functional relation to the superior spring element, the upper, and the heel counter, and projecting rearward and downward therefrom forming a V-shape, the superior spring element, inferior spring element, heel counter, upper, and posterior outsole element being capable of being removably secured in functional relation by the at least one fastening component to assemble and make the custom article of footwear, and the superior spring element can be placed within the upper and the superior spring element, upper, heel counter, inferior spring element, and posterior outsole element can be removably secured in functional relation with the at least one fastening component, thereby completing the assembly for making of the article of footwear.

The inferior spring element can further comprise a flexural axis deviated from the transverse axis in the range between 10-50 degrees and posterior of the flexural axis the posterior to anterior length of the inferior spring element can be less on the medial side than on the lateral side, whereby the inferior spring element can exhibit greater flexural stiffness on the medial side than on the lateral side.

The inferior spring element can substantially comprise a fiber composite material comprising a spring that stores and returns at least 70 percent of the mechanical energy imparted thereto when measured using test method ASTM 790.

The upper can further comprise a plurality of openings on the inferior side, and at least a portion of the anterior outsole element can be capable of being positioned in functional

relation within the upper, and the anterior outsole element can further comprise a plurality of traction members capable of substantially projecting through the openings on the inferior side of the upper, whereby the anterior outsole element can be positioned in functional relation within the upper and the plurality of traction members can substantially project through the openings on the inferior side of the upper.

The sufficient footwear components can further comprise a fluid-filled bladder. The superior spring element can further comprise at least one flex notch. The sufficient footwear components can further comprise a posterior spacer. The sufficient footwear components can further comprise a stabilizer comprising a middle outsole element.

The insole can be removable and replaceable and provided in a plurality of variations including different alternate effective length sizes for possible use within a given selected upper, whereby the effective length size provided by the upper can be selectively varied. In addition, the insole can be removable and replaceable and provided in a plurality of variations including different alternate effective width sizes for possible use within a given selected upper, whereby the effective width size provided by the upper can be selectively varied.

The inferior spring element can comprise a symmetrical curved configuration on both the medial side and the lateral side. Alternately, the inferior spring element can comprise an asymmetrical curved configuration on the medial side and the lateral side. The inferior spring element can comprise a tapered configuration. The inferior spring element can comprise an anterior portion extending between the anterior side of the inferior spring element and an anterior tangent point, a middle portion including an anterior curve extending downwards between the anterior tangent point and a posterior tangent point, and a posterior portion extending upwards between the posterior tangent point and the posterior side of the inferior spring element, and the anterior curve can comprise a substantially symmetrical fitted radius of curvature between the anterior tangent point and the posterior tangent point. Given a men's size 9 article of footwear, the superior spring element can comprise a thickness in the range between 0.5 and 7 mm, and the inferior spring element can comprise a length in the range between 100–160 mm, a width in the range between 70–90 mm, and a thickness in the range between 3 and 7 mm.

The present invention teaches a method of conducting business including making and delivering footwear components sufficient for making a custom article of footwear comprising the steps of:

- a) Collecting data relating to a consumer, and said consumer's preferences, and anatomical features and measurements of an individual's foot;
- b) Creating from the collected data information and intelligence for providing footwear components for making the custom article of footwear for the individual;
- c) Providing to the consumer a selection of a plurality of footwear components, and a plurality of variations of a plurality of the footwear components, and including at least one fastening component;
- d) The consumer selecting from the selection of a plurality of footwear components sufficient footwear components for making the custom article of footwear for the individual;
- e) Providing the information and intelligence further comprising said selections made by said consumer in step d to

a physical location from which the sufficient footwear components for making the custom article of footwear can be distributed; and,

- f) Causing the sufficient footwear components for making the custom article of footwear to be delivered to a designated address, whereby the assembly for making of the custom article of footwear is thereafter completed by removably securing a plurality of the sufficient footwear components.
- 10 The present invention teaches a method of conducting business including making and delivering at least one footwear component for use in making a custom article of footwear comprising the steps of:
  - a) Collecting data relating to a consumer, and said consumer's preferences, and anatomical features and measurements of an individual's foot;
  - b) Creating from the collected data information and intelligence for providing at least one footwear component for use in making the custom article of footwear for the individual;
  - c) Providing to the consumer a selection of a plurality of footwear components, and a plurality of variations of a plurality of the footwear components, and including at least one fastening component;
  - d) The consumer selecting from the selection of a plurality of footwear components at least one select footwear component for use in making the custom article of footwear for the individual;
  - e) Providing the information and intelligence further comprising said at least one selection made by said consumer in step d to a physical location from which the at least one select footwear component for use in making the custom article of footwear can be distributed; and,
  - f) Causing the at least one select footwear component for use in making the custom article of footwear to be delivered to a designated address, whereby the assembly for making of the custom article of footwear is thereafter completed by removably securing the at least one select footwear component.
- 30 The present invention teaches a method of conducting business with the use of a vending device for making and delivering at least one footwear component for use in making a custom article of footwear comprising the steps of:
  - a) Collecting data relating to a consumer, and said consumer's preferences, and anatomical features and measurements of an individual's foot;
  - b) Creating from the collected data information and intelligence for providing at least one footwear component for use in making the custom article of footwear for the individual;
  - c) Providing to the consumer a selection of a plurality of footwear components, and a plurality of variations of a plurality of the footwear components, and including at least one fastening component;
  - d) The consumer selecting from the selection of a plurality of footwear components at least one select footwear component for use in making the custom article of footwear for the individual;
  - e) Providing the information and intelligence further comprising said at least one selection made by said consumer in step d to a physical location from which the at least one select footwear component for use in making the custom article of footwear can be distributed; and,
  - f) Causing the at least one select footwear component for use in making the custom article of footwear to be delivered to a designated address, wherein steps a-f are performed with the use of the vending device and the assembly for

making of the custom article of footwear is thereafter completed by removably securing the at least one select footwear component.

The aforementioned methods of making and delivering a custom article of footwear, or at least one component thereof, can be applied to many footwear products for use in running, walking, basketball, tennis, volleyball, cross-training, baseball, football, golf, soccer, cycling, sandals, skating, and hiking.

#### BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. 1 is a medial side view of an article of footwear including a spring element according to the present invention.

FIG. 2 is a top view of the article of footwear shown in FIG. 1.

FIG. 3 is a bottom view of the article of footwear shown in FIG. 1.

FIG. 4 is a longitudinal cross-sectional medial side view of the article of footwear shown in FIG. 1, with parts broken away.

FIG. 5 is a longitudinal cross-sectional lateral side view of the article of footwear shown in FIG. 1, with parts broken away.

FIG. 6 is a top view of a spring element in the article of footwear shown in FIG. 2, with the upper shown in dashed lines.

FIG. 7 is a top view of a two part spring element in the article of footwear shown in FIG. 2, with the upper shown in dashed lines.

FIG. 8 is a top view of a two part spring element in an article of footwear generally similar to that shown in FIG. 2, but having a relatively more curve lasted upper shown in dashed lines.

FIG. 9 is a bottom view of the article of footwear shown in FIG. 3, with the outsole elements being removed to reveal the anterior spring element, posterior spring element and inferior spring element.

FIG. 10 is a bottom view of an alternate article of footwear generally similar to that shown in FIG. 9, with the outsole elements being removed to reveal an anterior spring element, a posterior spring element, an inferior spring element having an alternate configuration, and also a possible position of a rocker sole configuration.

FIG. 11 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 1, with parts broken away, but having a forefoot area without toe spring.

FIG. 12 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 11, with parts broken away, but having a forefoot area including an outsole, foam midsole, and upper affixed together with an adhesive.

FIG. 13 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 12, with parts broken away, but having a forefoot area including a detachable outsole and foam midsole.

FIG. 14 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 4, with parts broken away, further including a spring guard, and also a rocker sole configuration.

FIG. 15 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that

shown in FIG. 4, with parts broken away, having a upper including a sleeve for accommodating a lasting board or spring element.

FIG. 16 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 4, with parts broken away, having fewer layers underlying the superior spring element.

FIG. 17 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 4, with parts broken away, having a upper affixed to a spring element.

FIG. 18 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 17, further including a posterior spacer including a spring guard.

FIG. 19 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 18, further including a vibration decay time modifier.

FIG. 20 is a longitudinal cross-sectional medial side view of an alternate article of footwear generally similar to that shown in FIG. 19, further including a spring guard including a plurality of vibration decay time modifiers.

FIG. 21 is a medial side view of an alternate article of footwear similar to that shown in FIG. 4, but having various components affixed together with the use of adhesives.

FIG. 22 is a bottom view of an alternate article of footwear similar to that shown in FIG. 3, having a spring element configured for accommodating a bicycle or skate cleat.

FIG. 23 is a medial side view of an alternate article of footwear generally similar to that shown in FIG. 17, but including a spring element which extends about the heel to form an integral heel counter, and about the lateral side of the forefoot to form a side support, with the outsole and inferior spring element removed, and including track spike elements.

FIG. 24 is a cross sectional view of the anterior spacer included in the article of footwear shown in FIG. 8, taken along line 24—24.

FIG. 25 is a cross sectional view of an alternate anterior spacer generally similar to that shown in FIG. 8, but having a wedge shape, taken along a line consistent with line 24—24.

FIG. 26 is a cross sectional view of the posterior spacer included in the article of footwear shown in FIG. 9, taken along line 26—26.

FIG. 27 is a cross sectional view of an alternate posterior spacer generally similar to that shown in FIG. 9, but having a wedge shape, taken along a line consistent with line 26—26.

FIG. 28 is a longitudinal cross-sectional medial side view of an alternate article of footwear having an alternate spring element with parts broken away.

FIG. 29 is a longitudinal cross-sectional medial side view of an alternate article of footwear having a spring element, and a selectively removable sole.

FIG. 30 is a bottom view of the inferior side of the upper of an article of footwear showing an anterior spring element having a plurality of openings.

FIG. 31 is a bottom view of the inferior side of the upper of an article of footwear showing a plurality of adjacent openings at different positions.

FIG. 32 is a bottom view of the inferior side of the upper of an article of footwear showing reinforcement material about a plurality of adjacent openings at different positions.

FIG. 33 is a bottom view of the inferior side of the upper of an article of footwear showing a plurality of adjacent openings at different positions.

FIG. 34 is a bottom view of the inferior side of the upper of an article of footwear showing reinforcement material about and between a plurality of openings.

FIG. 35 is a bottom view of the inferior side of an anterior spring element having a plurality of openings at different positions for being affixed in function relation to an upper and outsole.

FIG. 36 is a top view of the superior side of a spring element including an anterior spring element including a longitudinal slit, and posterior spring element.

FIG. 37 is a top view of the superior side of a spring element including an anterior spring element consisting of two separate parts, a medial anterior spring element and a lateral anterior spring element.

FIG. 38 is a transverse and exploded cross-sectional view of an article of footwear showing a lasting board or spring element having male mechanical engagement means affixed thereto, and also an upper, insole, sole, and female mechanical engagement means.

FIG. 39 is a transverse cross-sectional view of an article of footwear showing an insole overlapping the medial side and lateral side of a spring element.

FIG. 40 is a transverse cross-sectional view of an article of footwear showing a portion of the sole overlapping the medial side and lateral side of a spring element.

FIG. 41 is a transverse cross-sectional view of an article of footwear showing a separate lasting board and a spring element, and also an upper, insole, and outsole.

FIG. 42 is a transverse cross-sectional view of an article of footwear showing a sole affixed directly to an upper, and also a spring element.

FIG. 43 is a transverse cross-sectional view of an article of footwear showing a sole affixed directly to an upper, and also a spring element located within a recess.

FIG. 44 is a medial side view of a sandal including a spring element.

FIG. 45 is a longitudinal cross-sectional medial side view of an alternate article of footwear having outsole portions affixed directly to the superior spring element in the forefoot area.

FIG. 46 is a longitudinal cross-sectional medial side view of an alternate article of footwear having outsole portions affixed directly to the superior spring element in the forefoot area, and further including a supplemental posterior spring element in the rearfoot area.

FIG. 47 is a bottom view of the alternate article of footwear shown in FIG. 45 having outsole portions affixed directly to the superior spring element in the forefoot area.

FIG. 48 is a longitudinal cross-sectional medial side view of an alternate article of footwear having outsole portions affixed directly to an anterior spring element in the forefoot area.

FIG. 49 is a longitudinal cross-sectional medial side view of an alternate article of footwear having outsole portions affixed directly to an anterior spring element in the forefoot area that is affixed to an anterior spacer and a superior spring element.

FIG. 50 is an exploded side view of a spring element including a superior spring element having an anterior spring element and a posterior spring element, superior and inferior posterior spacers, a fastener, and an inferior spring element.

FIG. 51 is an exploded side view of a spring element including a superior spring element having an anterior

spring element and a posterior spring element, superior and inferior posterior spacers, a fastener, and an inferior spring element.

FIG. 52 is an exploded side view of a spring element including a superior spring element having an anterior spring element including a side support, a posterior spring element including a heel counter, superior and inferior posterior spacers, a fastener, and an inferior spring element.

FIG. 53 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having an asymmetrical shape.

FIG. 54 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having an asymmetrical shape.

FIG. 55 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape.

FIG. 56 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate mounting position.

FIG. 57 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate mounting position.

FIG. 58 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate mounting angle.

FIG. 59 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate mounting angle.

FIG. 60 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate medial mounting position.

FIG. 61 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate lateral mounting position.

FIG. 62 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate more anterior mounting position.

FIG. 63 is a bottom plan view of a spring element for use in an article of footwear having a superior spring element and an inferior spring element having a symmetrical shape and showing an alternate more posterior mounting position.

FIG. 64 is a top plan view of a superior spring element having a surface including affixing means.

FIG. 65 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having a notch and slit.

FIG. 66 is a bottom plan view of a spring element including a superior spring element and an inferior spring element consisting of two separate portions.

FIG. 67 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having a notch and slit.

FIG. 68 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having two notches.

FIG. 69 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having a slit.

FIG. 70 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having an opening.

FIG. 71 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having an opening.

FIG. 72 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having an opening.

FIG. 73 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal a midsole cushioning element and an inferior spring element.

FIG. 74 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal a midsole cushioning element and an inferior spring element.

FIG. 75 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal a midsole cushioning element and an inferior spring element.

FIG. 76 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal a midsole cushioning element and an inferior spring element.

FIG. 77 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal a column shaped midsole cushioning element and an inferior spring element.

FIG. 78 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal two column shaped midsole cushioning elements and an inferior spring element.

FIG. 79 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal three column shaped midsole cushioning elements and an inferior spring element.

FIG. 80 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal six column shaped midsole cushioning elements and an inferior spring element.

FIG. 81 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal five column shaped midsole cushioning elements and an inferior spring element.

FIG. 82 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal a midsole cushioning element including an opening and an inferior spring element.

FIG. 83 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal an inferior spring element having convex peak and concave valley portions extending longitudinally on the medial side.

FIG. 84 is a cross-sectional view along line 84—84 of the inferior spring element shown in FIG. 83 having convex peak and concave valley portions.

FIG. 85 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element having a medial extension.

FIG. 86 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element having a medial extension.

FIG. 87 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element having a medial extension.

FIG. 88 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element having concave peaks and convex valleys on the superior side.

FIG. 89 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element having greater thickness on the medial side.

FIG. 90 is a top plan view of a spring element including a superior spring element with parts broken away posterior of the flexural axis in order to reveal an inferior spring element having convex and concave portions extending transversely from the medial side.

FIG. 91 is a side view of a spring element including a superior spring element and an inferior spring element including inserts and convex and concave portions.

FIG. 92 is a side view of a spring element including a superior spring element and an inferior spring element including convex and concave portions.

FIG. 93 is a top perspective view of a spring element including a superior spring element and an inferior spring element showing a cross-section taken along line 94—94.

FIG. 94 is a cross-sectional view of the spring element shown in FIG. 93 taken along line 94—94.

FIG. 95 is a cross-sectional view of an alternate spring element taken along a line similar to 94—94 shown in FIG. 93.

FIG. 96 is a longitudinal cross-sectional medial side view of an alternate article of footwear including a midsole cushioning element affixed between the superior spring element and the inferior spring element.

FIG. 97 is a longitudinal cross-sectional medial side view of an alternate article of footwear including two midsole cushioning elements affixed to the superior spring element.

FIG. 98 is a longitudinal cross-sectional medial side view of an alternate article of footwear including three midsole cushioning elements affixed to the inferior spring element.

FIG. 99 is a longitudinal cross-sectional medial side view of an alternate article of footwear including a midsole cushioning element comprising a fluid-filled bladder affixed between the superior spring element and the inferior spring element.

FIG. 100 is a longitudinal cross-sectional medial side view of an alternate article of footwear including two midsole cushioning elements consisting of a first fluid-filled bladder affixed between the superior spring element and the inferior spring element in the rearfoot area, and a second fluid-filled bladder affixed between the superior spring element and an inferior anterior spring element in the forefoot area.

FIG. 101 is a perspective exploded view of a spring element including a superior spring element, and an inferior spring element showing a fastener and a locating pin.

FIG. 102 is a bottom plan view of a spring element including a superior spring element, and an inferior spring element having an insert.

FIG. 103 is a bottom plan view of a spring element including a superior spring element, and an inferior spring element having different fiber composite materials on the medial side than on the lateral side.

FIG. 104 is a bottom plan view of a spring element including a superior spring element, and an inferior spring element having different fiber composite materials on the medial side than on the lateral side.

FIG. 105 is a bottom plan view of a spring element including a superior spring element, and an inferior spring

element having different fiber composite material orientations on the medial side than on the lateral side.

FIG. 106 is a bottom plan view of a spring element including a superior spring element, and an inferior spring element having different fiber composite material orientation on the medial side, lateral side, and posterior side, than in the middle portion.

FIG. 107 is a top plan view of a spring element including a superior spring element and an inferior spring element made of a metal material.

FIG. 108 is a cross-sectional view of the spring element shown in FIG. 107 taken along line 108—108.

FIG. 109 is a bottom plan view of a spring element including a superior spring element and an inferior spring element made of a metal material.

FIG. 110 is a cross-sectional view of the spring element shown in FIG. 109 taken along line 110—110.

FIG. 111 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having a symmetrical cantilever shape.

FIG. 112 is a cross-sectional view of the spring element shown in FIG. 111 taken along line 112—112.

FIG. 113 is a bottom plan view of a spring element including a superior spring element and an inferior spring element having an asymmetrical cantilever shape.

FIG. 114 is a cross-sectional view of the spring element shown in FIG. 113 taken along line 114—114.

FIG. 115 is a cross-sectional view of the spring element shown in FIG. 74 taken along line 115—115.

FIG. 116 is a cross-sectional view of the spring element shown in FIG. 75 taken along line 116—116.

FIG. 117 is a cross-sectional view of the spring element shown in FIG. 76 taken along line 117—117.

FIG. 118 is a cross-sectional view of an alternate spring element taken along a line similar to 115 shown in FIG. 74.

FIG. 119 is a cross-sectional view of an alternate spring element taken along a line similar to 116 shown in FIG. 75.

FIG. 120 is a cross-sectional view of an alternate spring element taken along a line similar to 117 shown in FIG. 76.

FIG. 121 is a side view of a spring element including a superior spring element including a heel counter and side support, and an inferior spring element.

FIG. 122 is a cross-sectional view taken along line 122—122 of the superior spring element shown in FIG. 121.

FIG. 123 is a cross-sectional view taken along line 123—123 of the superior spring element shown in FIG. 121.

FIG. 124 is a cross-sectional view of an alternate spring element taken along a line similar to 122 shown in FIG. 121.

FIG. 125 is a cross-sectional view of an alternate spring element having an arcuate shape taken along a line similar to 122 shown in FIG. 121.

FIG. 126 is a bottom plan view of a spring element including a superior spring element, an anterior spring element, and an inferior spring element.

FIG. 127 is a bottom plan view of a spring element including a superior spring element, an anterior spring element, and an inferior spring element.

FIG. 128 is a bottom plan view of a spring element including a superior spring element, an anterior spring element, and an inferior spring element.

FIG. 129 is a bottom plan view of a spring element including a superior spring element, an anterior spring element, and an inferior spring element.

FIG. 130 is a bottom plan view of a spring element including a superior spring element, an anterior spring element, and an inferior spring element.

FIG. 131 is a bottom plan view of a spring element including a superior spring element, an anterior spring element, and an inferior spring element.

FIG. 132 is a bottom plan view of a spring element including a superior spring element, and an inferior spring element having a U-shape.

FIG. 133 is a bottom plan view of a spring element including a superior spring element, and an inferior spring element having a J-shape.

FIG. 134 is a bottom plan view of a spring element including a superior spring element, and an inferior spring element having a curved shape.

FIG. 135 is a cross-sectional view taken along line 135—135 of the spring element shown in FIG. 134.

FIG. 136 is a cross-sectional view taken along a line similar to 135—135 of an alternate spring element having a cantilever shape.

FIG. 137 is a medial side view of a spring element including a superior spring element and an inferior spring element including a concavity in the midfoot area and toe spring in the forefoot area.

FIG. 138 is a medial side view of a spring element including a superior spring element, an inferior spring element, including a concavity in the midfoot area, but substantially without toe spring in the forefoot area.

FIG. 139 is a medial side view of a spring element including a superior spring element and an inferior spring element including a flexural axis and toe spring in the forefoot area.

FIG. 140 is a medial side view of a spring element including a superior spring element, an inferior spring element including a flexural axis in the forefoot area, but substantially without toe spring in the forefoot area.

FIG. 141 is a medial side view of a spring element including a superior spring element formed in continuity with an inferior spring element having an elliptical shape near the posterior side.

FIG. 142 is a medial side view of a spring element including a superior spring element formed in continuity with an inferior spring element having an upwardly curved shape near the posterior side.

FIG. 143 is a medial side view of a spring element including a superior spring element having a downwardly curved shape near the posterior side which is formed in continuity with an inferior spring element.

FIG. 144 is a medial side view of a spring element including a superior spring element formed in continuity with an inferior spring element having an elliptical shape near the posterior side and a concavity in the midfoot area.

FIG. 145 is a medial side view of a spring element including a superior spring element which is affixed to a posterior spacer and a generally planar inferior spring element.

FIG. 146 is a medial side view of a spring element including a superior spring element which is affixed to a posterior spacer and an inferior spring element that is curved upwards at the posterior side.

FIG. 147 is a medial side view of a spring element including a superior spring element which is affixed to a posterior spacer and an inferior spring element that is curved downward near its anterior end and curved upwards near the posterior side.

FIG. 148 is a medial side view of a spring element including a superior spring element which is affixed to a posterior spacer and an inferior spring element that is curved and curved upwards at both ends.

FIG. 149 is a medial side view of a spring element including a superior spring element which is affixed to a posterior spacer and an inferior spring element that projects downwards near its anterior end, but is approximately horizontal near the posterior side.

FIG. 150 is a medial side view of a spring element including a superior spring element which is formed in continuity with an inferior spring element that has an elliptical shape near the posterior side, and the inferior spring element is affixed to a posterior spacer and the superior spring element near its anterior end.

FIG. 151 is a bottom plan view of a spring element including a superior spring element and an inferior spring element showing a line which represents the approximate position of the metatarsal-phalangeal joints and also the flexural axis.

FIG. 152 is a bottom plan view of a spring element including a superior spring element and an inferior spring element showing a line which represents the approximate position of the metatarsal-phalangeal joints, and a more posterior and parallel flexural axis.

FIG. 153 is a bottom plan view of a spring element including a superior spring element and an inferior spring element showing a line which represents the approximate position of the metatarsal-phalangeal joints and also a more posterior flexural axis that is approximately parallel near the medial side, but which curves away near the lateral side.

FIG. 154 is a bottom plan view of a spring element including a superior spring element and an inferior spring element showing a line which represents the approximate position of the metatarsal-phalangeal joints and also a more posterior and arcuate flexural axis.

FIG. 155 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, and also straight last, semi-curved last, and curved last configurations.

FIG. 156 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, and a notch on the lateral side.

FIG. 157 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, and two notches on the lateral side.

FIG. 158 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, and one notch on the medial side.

FIG. 159 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, a straight last configuration, and two notches on the lateral side.

FIG. 160 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, and an opening which forms a slot near the lateral side.

FIG. 161 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, a notch-on the lateral side, and a notch extending from near the anterior side forming a slit.

FIG. 162 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, and a notch extending from near the anterior side forming a slit.

FIG. 163 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, a notch on the lateral side, and an opposing notch on the medial side.

FIG. 164 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, and three opposing notches on the medial side.

FIG. 165 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, a notch on the lateral side, and a notch extending from the anterior side forming a slit.

FIG. 166 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, and three notches on the lateral side.

FIG. 167 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, and one notch on the medial side.

FIG. 168 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, and two notches on the medial side.

FIG. 169 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, and two notches on the medial side.

FIG. 170 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, four notches on the lateral side, and one notch on the medial side.

FIG. 171 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, four notches on the lateral side, and two notches on the medial side.

FIG. 172 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, four notches on the lateral side, and three notches on the medial side.

FIG. 173 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, four notches on the lateral side, and four notches on the medial side.

FIG. 174 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, a curved lasted configuration, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 175 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, a semi-curved lasted configuration, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 176 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, one notch on the medial side, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 177 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, two notches on the medial side, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 178 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, three notches on the medial side, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 179 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, one

notch on the medial side, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 180 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, one notch on the lateral side, and two notches extending from the anterior side forming two longitudinal slits.

FIG. 181 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, one notch on the lateral side, and three notches extending from the anterior side forming three longitudinal slits.

FIG. 182 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side, and one notch on the medial side.

FIG. 183 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, four notches on the lateral side, and one notch on the medial side.

FIG. 184 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, and two notches extending from the anterior side forming two longitudinal slits.

FIG. 185 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, and three notches extending from the anterior side forming three longitudinal slits.

FIG. 186 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, a notch on the lateral side, an opposing notch on the medial side, and two notches extending from the anterior side forming two longitudinal slits.

FIG. 187 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, and two opposing notches on the medial side.

FIG. 188 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, one notch on the medial side, an opposing notch on the lateral side, and one notch extending from the anterior side forming a longitudinal slit.

FIG. 189 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the medial side, two opposing notches on the lateral side, and one notch extending from the anterior side forming a longitudinal slit.

FIG. 190 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, one notch on the medial side, an opposing notch on the lateral side, and three notches extending from the anterior side forming three longitudinal slits.

FIG. 191 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, four notches on the medial side, four opposing notches on the lateral side, and one notch extending from the anterior side forming a longitudinal slit.

FIG. 192 is a top plan view of a spring element showing a notch on the medial side that extends anteriorly forming a longitudinal slit.

FIG. 193 is a top plan view of a spring element showing a relatively wide notch on the medial side that extends anteriorly forming a relatively wide longitudinal slit.

FIG. 194 is a top plan view of a spring element showing an oval shaped opening in the forefoot area.

FIG. 195 is a top plan view of a spring element showing an oval shaped opening in the forefoot area, and another oval shaped opening in the rearfoot area.

FIG. 196 is a top plan view of a spring element having an elongated opening extending between the rearfoot area, midfoot area, and forefoot area.

FIG. 197 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side including one in the midfoot area, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 198 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, three notches on the lateral side including one in the midfoot area which extends into the rearfoot area, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 199 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, a relatively wide notch on the medial side extending into the midfoot area and rearfoot area, and a notch extending from the anterior side forming a longitudinal slit.

FIG. 200 is a top plan view of a spring element showing a notch on the lateral side that extends anteriorly forming a longitudinal slit.

FIG. 201 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, two notches on the medial side, and two notches extending from the anterior side forming two longitudinal slits forming three fingers resembling those of a bird or reptile.

FIG. 202 is a top plan view of a spring element showing a line that represents the approximate position of the metatarsal-phalangeal joints, two notches on the lateral side, two notches on the medial side, and three notches extending from the anterior side forming three longitudinal slits forming four fingers resembling those of a bird or reptile.

FIG. 203 is a top plan view of a spring element including a posterior spring element including a protrusion, a removable lateral anterior spring element and also medial anterior spring element, and fasteners.

FIG. 204 is a top plan view of a spring element including a removable lateral anterior spring element and a fastener.

FIG. 205 is a top plan view of a spring element including a removable medial anterior spring element and a fastener.

FIG. 206 is a top plan view of a spring element including a removable lateral anterior spring element and fasteners.

FIG. 207 is a top plan view of a spring element including a removable lateral anterior spring element, a fastener, and three notches extending from the anterior side forming three longitudinal slits.

FIG. 208 is a top plan view of a spring element including three fingers, three fasteners, and a posterior spring element.

FIG. 209 is a top plan view of a spring element including an anterior spring element having a notch on the lateral side that extends anteriorly forming a longitudinal slit, a fastener, and a posterior spring element.

FIG. 210 is a top plan view of a spring element including an anterior spring element having a notch on the lateral side and two notches which extend from the anterior side forming two longitudinal slits, a fastener, and a posterior spring element that extends into the forefoot area.

FIG. 211 is a top plan view of a spring element including an anterior spring element having two notches on the lateral side, one notch on the medial side, and two notches which

extend from the anterior side forming two longitudinal slits, a fastener, and a posterior spring element that extends into the midfoot area.

FIG. 212 is a top plan view of a spring element including an anterior spring element having two notches on the lateral side, one notch on the medial side, and two notches which extend from the anterior side forming two longitudinal slits, a fastener, and a posterior spring element having a different configuration than that shown in FIG. 211.

FIG. 213 is a top plan view of a spring element including an anterior spring element having two notches on the lateral side which extend nearly to the longitudinal axis, a fastener, and a posterior spring element.

FIG. 214 is a top plan view of a spring element including a lateral anterior spring element, a medial anterior spring element, a lateral posterior spring element, a medial posterior spring element, and a bracket.

FIG. 215 is a top plan view of a spring element including a removable anterior spring element including a notch extending from the anterior side forming a longitudinal slit, two fasteners, and a posterior spring element having two notches on the lateral side.

FIG. 216 is a top plan view of a spring element including a removable lateral anterior spring element and medial anterior spring element, two fasteners, and a posterior spring element having a notch on the lateral side.

FIG. 217 is a top plan view of a spring element including a lateral anterior spring element formed as a single part with a medial posterior spring element, a medial anterior spring element formed as a single part with a lateral posterior spring element, and a fastener.

FIG. 218 is a top plan view of a spring element including an anterior spring element, a posterior spring element, and a fastener.

FIG. 219 is a top plan view of a spring element which includes an anterior spring element, an intermediate spring element, a posterior spring element and two fasteners.

FIG. 220 is a top plan view of a spring element that includes a notch and a plurality of openings.

FIG. 221 is a longitudinal cross-sectional side view of an article of footwear including a spring element including a superior spring element, an anterior spring element, and an inferior spring element.

FIG. 222 is a cross-sectional view taken along line 222—222 of the inferior spring element shown in FIG. 221.

FIG. 223 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 224 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 225 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 226 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 227 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 228 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 229 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 230 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element.

FIG. 231 is a cross-sectional view taken along a line similar to 222—222 of an inferior spring element similar to that shown in FIG. 228, but also showing deflection of a traction member.

FIG. 232 is a bottom plan view of a spring element including an inferior spring element including an outsole having traction members.

FIG. 233 is a longitudinal cross-sectional side view of an alternate article of footwear including a spring element and fluid-filled bladders.

FIG. 234 is a longitudinal cross-sectional lateral side view of the article of footwear and spring element shown in FIG. 45.

FIG. 235 is a longitudinal cross-sectional lateral side view of the article of footwear and spring element shown in FIG. 49.

FIG. 236 is a bottom plan view of an article of footwear including a midsole on the medial side, and a spring element including a superior spring element, and an inferior spring element.

FIG. 237 is a bottom plan view of an article of footwear including a midsole on the medial side, and a spring element including a superior spring element, and an inferior spring element.

FIG. 238 is a bottom plan view of an article of footwear including a midsole on the medial side, and a spring element including a superior spring element, and an inferior spring element.

FIG. 239 is a bottom plan view of an article of footwear including a midsole on the medial side, and a spring element including a superior spring element, and an inferior spring element.

FIG. 240 is a bottom plan view of an article of footwear including a midsole on the medial side, and a spring element including a superior spring element, and an inferior spring element.

FIG. 241 is a bottom plan view of an article of footwear including a midsole on the medial side, and a spring element including a superior spring element, and an inferior spring element.

FIG. 242 is a cross-sectional view taken along line 242—242 shown in FIG. 241.

FIG. 243 is a cross-sectional view taken along a line similar to 242—242 shown in FIG. 241 showing an alternate footwear construction relative to that shown in FIG. 242.

FIG. 244 is a cross-sectional view taken along a line similar to 242—242 shown in FIG. 241 showing an alternate footwear construction relative to that shown in FIG. 242.

FIG. 245 is a cross-sectional view taken along a line similar to 242—242 shown in FIG. 241 showing an alternate footwear construction relative to that shown in FIG. 242.

FIG. 246 is a bottom plan view of an article of footwear including a midsole on the medial side, a spring element including a superior spring element, and an inferior spring element including an anterior spring element.

FIG. 247 is a bottom plan view of an article of footwear including a spring element including a superior spring element, and an inferior spring element including an anterior spring element.

FIG. 248 is a bottom plan view of an article of footwear including a spring element including a superior spring element, and an inferior spring element including an anterior spring element.

FIG. 249 is a longitudinal cross-sectional lateral side view of the embodiment shown in FIG. 246 showing an article of footwear including a midsole on the medial side, a spring element including a superior spring element, and an inferior spring element including an anterior spring element.

FIG. 250 is a flow diagram regarding a method of conducting business including making and delivering a custom article of footwear.

FIG. 251 is a flow diagram regarding a method of conducting business including making and delivering footwear components sufficient for making a custom article of footwear.

FIG. 252 is a flow diagram regarding a method of conducting business including making and delivering at least one footwear component for use in making a custom article of footwear.

FIG. 253 is a flow diagram regarding a method of conducting business with the use of a vending device for making and delivering at least one footwear component for use in making a custom article of footwear.

FIG. 254 is a bottom plan view of an article of footwear including a plurality of openings on the inferior side and a plurality of traction members projecting therethrough.

FIG. 255 is a longitudinal cross-sectional side view of an article of footwear including a plurality of openings in the quarter and portions of a strap passing therethrough.

FIG. 256 is a side view of an article of footwear with parts broken away including an external removable strap.

FIG. 257 is a bottom plan view of the article of footwear shown in FIG. 256.

FIG. 258 is a bottom plan view of an article of footwear including a plurality of openings and a plurality of traction members projecting therethrough.

FIG. 259 is a bottom plan view of an article of footwear including a plurality of openings and a plurality of traction members projecting therethrough.

FIG. 260 is a bottom plan view of an article of footwear including a plurality of openings and a plurality of traction members projecting therethrough.

FIG. 261 is a longitudinal cross-sectional exploded side view of an article of footwear including an upper, insole, superior spring element, anterior outsole element, fastener, strap, and inferior spring element including a posterior outsole element.

FIG. 262 is a bottom plan view of an anterior outsole element including traction members and a backing.

FIG. 263 is a bottom plan view of an anterior outsole element including traction members and a backing.

FIG. 264 is a top plan view of an anterior outsole element including traction members and a backing.

FIG. 265 is a top plan view of an anterior outsole element including traction members and a backing.

FIG. 266 is a side cross-sectional view of a spring element having parts broken away and including a hook.

FIG. 267 is a top plan view of a spring element having parts broken away, and including a hook generally similar to that shown in FIG. 266.

FIG. 268 is a top plan view of a spring element having parts broken away, and including an opening and a notch.

FIG. 269 is a side view of a spring element having parts broken away, and including a fastener including a hook.

FIG. 270 is a top plan view of the fastener including a hook shown in FIG. 269.

FIG. 271 is a side view of a spring element having parts broken away, and including a fastener including a hook.

FIG. 272 is a top plan view of the fastener including a hook shown in FIG. 271.

FIG. 273 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 274 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 275 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 276 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 277 is a side cross-sectional view of a spring element having parts broken away, and having a outsole including a backing that includes a fastener having a hook affixed thereto.

FIG. 278 is a side cross-sectional view of a spring element having parts broken away, and having a outsole including a backing that includes a fastener including a female part having a male part affixed thereto.

FIG. 279 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 280 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 281 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 282 is a side cross-sectional view of a spring element having parts broken away, and having a fastener including male and female parts affixed thereto.

FIG. 283 is a side view of an article of footwear with parts broken away, and including an external strap.

FIG. 284 is a longitudinal cross-sectional side view of an article of footwear including an insole, a superior spring element, anterior outsole element including self-adhesive, fastener, upper, inferior spring element, middle outsole element, and a posterior outsole element.

FIG. 285 is an exploded side view of an article of footwear including an insole, a superior spring element, anterior outsole element including male mating structures, a fastener, an upper, an inferior spring element, a middle outsole element, and a posterior outsole element.

FIG. 286 is a side cross-sectional view of a fastener affixed in functional relation to a spring element having parts broken away, and a sole having parts broken away.

FIG. 287 is an exploded side view of an article of footwear including an insole, a superior spring element including female mating structures, an anterior outsole element including male mating structures, a fastener, an upper, an inferior spring element, a middle outsole element, and a posterior outsole element.

FIG. 288 is an exploded side view of an article of footwear including an insole, a superior spring element including male mating structures, anterior outsole element including female mating structures, fastener, upper, inferior spring element, middle outsole element, and posterior outsole element.

FIG. 289 is a side cross-sectional view of an article of footwear including an insole, a superior spring element including an anterior spring element including female mating structures and a posterior spring element, an anterior outsole element including male mating structures, a fastener, an upper, an inferior spring element, a middle outsole element, and a posterior outsole element.

FIG. 290 is a top plan view of a mold for making at least a portion of a spring element.

FIG. 291 is a longitudinal cross-sectional side view of an article of footwear including a superior spring element, an inferior spring element, an anterior spring element, and fluid-filled bladders.

FIG. 292 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-

filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 293 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders including a plurality of chambers as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 294 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders including a plurality of chambers as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 295 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 296 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 297 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 298 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 299 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 300 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 301 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 291 showing fluid-filled bladders as if it were possible to view these structures through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 302 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 304 showing a fluid-filled bladder as if it were possible to view the structure through a transparent anterior spring element and outsole.

FIG. 303 is a bottom plan view of an article of footwear generally similar to that shown in FIG. 305 showing a fluid-filled bladder as if it were possible to view the structure through a transparent anterior spring element, inferior spring element, and outsole.

FIG. 304 is a longitudinal cross-sectional side view of an article of footwear generally similar to that shown in FIG. 302.

FIG. 305 is a longitudinal cross-sectional side view of an article of footwear generally similar to that shown in FIG. 303.

FIG. 306 is a longitudinal cross-sectional side view of an article of footwear showing an upper, insole, superior spring element including an anterior spring element and posterior spring element, male and female mating structures, fastener,

anterior outsole element including a backing and an outsole, inferior spring element, and a posterior outsole element including a pocket, a backing, and an outsole.

FIG. 307 is a longitudinal cross-sectional exploded side view of the article of footwear shown in FIG. 306.

FIG. 308 is a top plan view of an insole for use in the article of footwear shown in FIG. 307.

FIG. 309 is a top plan view of the posterior spring element and anterior spring element shown in FIG. 307.

FIG. 310 is a bottom plan view of the posterior spring element, anterior spring element including female mating structures, anterior outsole element including male mating structures, inferior spring element and posterior outsole element shown in FIG. 307.

FIG. 311 is a top plan view of an alternate posterior spring element.

FIG. 312 is a top plan view of an alternate anterior spring element.

FIG. 313 is a top plan view of the posterior spring element and anterior spring element shown in FIGS. 311 and 312.

FIG. 314 is a bottom plan view of the posterior spring element and anterior spring element shown in FIGS. 311 and 312, and an anterior outsole element.

FIG. 315 is a top plan view of an alternate posterior spring element.

FIG. 316 is a top plan view of an alternate anterior spring element.

FIG. 317 is a top plan view of the posterior spring element and anterior spring element shown in FIGS. 315 and 316.

FIG. 318 is a bottom plan view of the posterior spring element and anterior spring element shown in FIGS. 315 and 316, and an anterior outsole element.

FIG. 319 is a top plan view of an inferior spring element, and a posterior outsole element.

FIG. 320 is a bottom plan view of an inferior spring element, and a posterior outsole element.

FIG. 321 is a bottom plan view of an inferior spring element, and a posterior outsole element having a different design.

FIG. 322 is a bottom plan view of an inferior spring element, and a posterior outsole element having a different design.

FIG. 323 is a longitudinal cross-sectional side view of an article of footwear including an upper, insole, superior spring element including a posterior spring element and an anterior spring element, anterior outsole element including a backing and traction elements, fastener, an inferior spring element, and a posterior outsole element.

FIG. 324 is a longitudinal cross-sectional side view of an alternate article of footwear relative to that shown in FIG. 323 including an upper, insole, superior spring element including a posterior spring element and an anterior spring element, anterior outsole element including a backing and traction elements, fastener, an inferior spring element, and a posterior outsole element.

FIG. 325 is a longitudinal cross-sectional side view of an alternate article of footwear relative to that shown in FIG. 323 including an upper, insole, superior spring element including a posterior spring element and an anterior spring element, anterior outsole element including a backing and traction elements, fastener, an inferior spring element, and a posterior outsole element.

FIG. 326 is a longitudinal cross-sectional side view of an alternate article of footwear relative to that shown in FIG. 323 including an upper, insole, superior spring element including a posterior spring element and an anterior spring element, male and female mating structures, fastener,



FIG. 345 is a longitudinal cross-sectional side view of an alternate article of footwear relative to that shown in FIG. 343 including an upper, insole, superior spring element including a posterior spring element and anterior spring elements, anterior outsole element including a backing and traction elements, fastener, external stability element, a plurality of cushioning elements, an inferior spring element, and a posterior outsole element.

FIG. 346 is a longitudinal cross-sectional side view of an alternate article of footwear relative to that shown in FIG. 342 including an upper, insole, superior spring element including a posterior spring element and anterior spring elements, anterior outsole element including a backing and traction elements, fastener, external stability element, fluid-filled bladders, an inferior spring element, and a posterior outsole element.

FIG. 347 is a longitudinal cross-sectional side view of an alternate article of footwear relative to that shown in FIG. 346 including an upper, insole, superior spring element including a posterior spring element and anterior spring elements, anterior outsole element including a backing and traction elements, fastener, external stability element, fluid-filled bladders, an inferior spring element, and a posterior outsole element.

FIG. 348 is a longitudinal cross-sectional side view of an alternate article of footwear relative to that shown in FIG. 346 including an upper, insole, superior spring element including a posterior spring element and anterior spring elements, anterior outsole element including a backing and traction elements, fastener, external stability element, fluid-filled bladders, an inferior spring element, and a posterior outsole element.

FIG. 349 is a side view of an upper including a textile material and a plastic material mounted on a footwear last.

FIG. 350 is a side view of an alternate upper including a textile material and a plastic material mounted on a footwear last.

FIG. 351 is a bottom plan view of an upper including openings on the inferior side for the passage of traction members therethrough that is generally similar to the uppers shown in FIGS. 349 and 350.

FIG. 352 is a side view of an article of footwear generally similar to that shown in FIG. 338, but including an upper having openings for the passage of traction members therethrough that extend upwards on the medial side, lateral side, and at least a portion of the anterior side.

FIG. 353 is a side view of an article of footwear generally similar to that shown in FIG. 341, but including an upper having openings for the passage of traction members therethrough that extend upwards on the medial side, lateral side, and at least a portion of the anterior side.

FIG. 354 is a bottom plan view of an upper including openings on the inferior side for the passage of traction members therethrough that is generally similar to the uppers shown in FIGS. 352 and 353.

FIG. 355 is a side view of an article of footwear having an upper including three straps.

FIG. 356 is side view of an article of footwear including a removable strap having openings and eyestays.

FIG. 357 is a side view of an article of footwear including an alternate removable strap including VELCRO® hook and pile.

FIG. 358 is a top plan view of a pattern for an upper of an article of footwear that is substantially formed in a single part.

FIG. 359 is a top plan view of an alternate pattern for an upper of an article of footwear that is substantially formed in a single part.

FIG. 360 is a top plan view of an alternate pattern for an upper of an article of footwear that is substantially formed in two parts.

FIG. 361 is a bottom plan view of an upper of an article of footwear having an opening in the rearfoot area.

FIG. 362 is a top plan view of a posterior spring element having an opening in the rearfoot area.

FIG. 363 is a side perspective view of a posterior spring element having a three dimensional shape including a relatively low profile cupped shape about the medial, lateral, and posterior sides.

FIG. 364 is a side perspective view of a posterior spring element having a three dimensional shape including a heel counter having a relatively high profile about the medial, lateral, and posterior sides.

FIG. 365 is a side perspective view of a posterior spring element having a three dimensional shape including two generally opposing heel counters having a relatively high profile on the medial and lateral sides, and a relatively low profile cupped shape about the posterior side.

FIG. 366 is a top plan view of an inferior spring element showing a position associated with a width measurement and also another position associated with a length measurement.

FIG. 367 is a top plan view of an inferior spring element showing a flexural axis orientated at approximately 35 degrees from the transverse axis for possible use by a wearer characterized as having a relatively neutral or normal rearfoot motion.

FIG. 368 is a top plan view of an inferior spring element showing a flexural axis orientated at approximately 45 degrees from the transverse axis for possible use by a wearer having a rearfoot motion characterized by substantial pronation.

FIG. 369 is a top plan view of an inferior spring element showing a flexural axis orientated at approximately 25 degrees from the transverse axis for possible use by a wearer having a rearfoot motion characterized by substantial supination.

FIG. 370 is a top plan view of an inferior spring element showing a flexural axis orientated at approximately 90 degrees from the longitudinal axis, thus generally consistent with the transverse axis.

FIG. 371 is a side view of an inferior spring element affixed in functional relation to an article of footwear showing possible deflection of the inferior spring element with an arrow, and also an associated table for selecting a desired amount of deflection.

FIG. 372 is a side view of an inferior spring element showing the thickness of the inferior spring element with an arrow, and also an associated table for selecting a desired thickness/stiffness.

FIG. 373 is a side perspective view of an inferior spring element having an asymmetrical curvature on the medial side versus the lateral side.

FIG. 374 is a side perspective view of an inferior spring element having a symmetrical curvature on the medial side and the lateral side.

FIG. 375 is a bottom plan view of a posterior outsole element mounted on an inferior spring element showing a position associated with a width measurement and also another position associated with a length measurement.

FIG. 376 is a bottom plan view of a posterior outsole element mounted on an inferior spring element having a

flexural axis oriented at approximately 35 degrees from the transverse axis similar to that shown in FIG. 367.

FIG. 377 is a bottom plan view of a posterior outsole element mounted on an inferior spring element having a flexural axis oriented at approximately 45 degrees from the transverse axis similar to that shown in FIG. 368.

FIG. 378 is a bottom plan view of a posterior outsole element mounted on an inferior spring element having a flexural axis oriented at approximately 25 degrees from the transverse axis similar to that shown in FIG. 369.

FIG. 379 is a bottom plan view of a posterior outsole element mounted on an inferior spring element having a flexural axis oriented at approximately 90 degrees from the transverse axis similar to that shown in FIG. 370.

FIG. 380 is a top plan view of a posterior outsole element mounted on an inferior spring element having a flexural axis oriented at approximately 35 degrees from the transverse axis similar to that shown in FIG. 367.

FIG. 381 is a top plan view of a posterior outsole element mounted on an inferior spring element having a flexural axis oriented at approximately 45 degrees from the transverse axis similar to that shown in FIG. 368.

FIG. 382 is a top plan view of a posterior outsole element mounted on an inferior spring element having a flexural axis oriented at approximately 25 degrees from the transverse axis similar to that shown in FIG. 369.

FIG. 383 is a top plan view of a posterior outsole element mounted on an inferior spring element having a flexural axis oriented at approximately 90 degrees, thus generally consistent with the transverse axis, and similar to the embodiment shown in FIG. 370.

FIG. 384 is a top plan view of a posterior outsole element including an opening for accommodating a fluid-filled bladder.

FIG. 385 is a top plan view of a posterior outsole element including an opening for accommodating a foam cushioning element.

FIG. 386 is a top plan view of a posterior outsole element including a plurality of openings for accommodating a fluid-filled bladder.

FIG. 387 is a top plan view of a posterior outsole element including a plurality of openings for accommodating a foam cushioning element.

FIG. 388 is a top plan view of a posterior outsole element including a plurality of openings for accommodating a fluid-filled bladder.

FIG. 389 is a top plan view of a posterior outsole element including a plurality of openings for accommodating a foam cushioning element.

FIG. 390 is a bottom plan view of a posterior outsole element including a plurality of traction members.

FIG. 391 is a bottom plan view of an anterior outsole element including a plurality of traction members.

FIG. 392 is a side view of an article of footwear including a posterior outsole element and also an anterior outsole element including a plurality of traction members generally similar to those shown in FIGS. 390-391.

FIG. 393 is a side view of an article of footwear including a posterior outsole element and also an anterior outsole element including a plurality of traction members having greater height than those shown in FIGS. 390-392.

FIG. 394 is a bottom plan view of an anterior spring element with no flex notches, but including a bicycle cleat system.

FIG. 395 is a top plan view of an anterior spring element generally similar to that shown in FIG. 316, but having two flex notches with a slightly different configuration.

FIG. 396 is a top plan view of an anterior spring element generally similar to that shown in FIG. 316, but including a greater number of flex notches.

FIG. 397 is a top plan view of an inferior anterior spring element including longitudinal and transverse flex notches.

FIG. 398 is a top plan view of an inferior anterior spring element including longitudinal flex notches.

FIG. 399 is a top plan view of an anterior spacer for use between an anterior spring element and an inferior anterior spring element similar to that shown in FIG. 342.

FIG. 400 is a cross-sectional view taken along line 400—400 of the anterior spacer shown in FIG. 399 having a generally planar configuration.

FIG. 401 is a cross-sectional view taken along a line similar to line 400—400 shown in FIG. 399 of an alternate anterior spacer having a inclined configuration.

FIG. 402 is a top plan view of an inferior anterior spring element generally similar to that shown in FIG. 397 at least partially positioned below an anterior spacer generally similar to that shown in FIG. 399, and the inferior anterior spring element is also at least partially contained within an anterior outsole element.

FIG. 403 is a top plan view of an inferior anterior spring element generally similar to that shown in FIG. 398 substantially positioned within an anterior outsole element.

FIG. 404 is a top plan view of an inferior anterior spring element generally similar to that shown in FIG. 397 substantially positioned within an anterior outsole element.

FIG. 405 is a bottom plan view of an inferior anterior spring element generally similar to that shown in FIG. 397 substantially positioned within an anterior outsole element.

FIG. 406 is a top plan view of an alternate anterior spacer for use between an anterior spring element and an inferior anterior spring element.

FIG. 407 is a posterior side view of the alternate anterior spacer shown in FIG. 406 for use between an anterior spring element and an inferior anterior spring element.

FIG. 408 is an anterior side view of the alternate anterior spacer for use between an anterior spring element and an inferior alternate spring element shown in FIG. 406.

FIG. 409 is a side cross-sectional view taken along line 409—409 of the alternate anterior spacer for use between an anterior spring element and an inferior alternate spring element shown in FIG. 406.

FIG. 410 is a bottom plan view of the inferior anterior spring element positioned within the anterior outsole element shown in FIG. 405, but also within the anterior spacer shown in FIGS. 406-409.

FIG. 411 is a bottom plan view of the anterior spacer shown in FIGS. 406-410, and also a plurality of fasteners having a semi-oval shape.

FIG. 412 is a longitudinal cross-sectional side view generally similar to that shown in FIG. 342 showing the inferior anterior spring element, anterior spacer, and anterior outsole element shown in FIGS. 404-411.

FIG. 413 is a top plan view of an inferior anterior spring element positioned within an anterior outsole element having a backing including a plurality of elevated semi-circular domes.

FIG. 414 is a top plan view of an inferior anterior spring element positioned within an anterior outsole element having a backing including a plurality of foam cushioning elements affixed thereto.

FIG. 415 is a top plan view of an inferior anterior spring element positioned within an anterior outsole element hav-

ing a backing including a plurality of openings for permitting portions of a foam cushioning element to project therethrough.

FIG. 416 is a top plan view of an inferior anterior spring element positioned within an anterior outsole element having a backing including a plurality of openings for permitting portions of a fluid-filled bladder to project therethrough.

FIG. 417 is a side view of an article of footwear including a middle outsole element.

FIG. 418 is a side view of an article of footwear including a middle outsole element substantially consisting of a fluid-filled bladder.

FIG. 419 is a partially exploded side view of an article of footwear including the middle outsole element shown in FIG. 418.

FIG. 420 is a side view of an article of footwear including a middle outsole element substantially consisting of a foam cushioning element.

FIG. 421 is a bottom plan view of the article of footwear including the middle outsole element shown in FIG. 418.

FIG. 422 is a bottom plan view of the article of footwear including the middle outsole element shown in FIG. 420.

FIG. 423 is a side view of a footwear last showing toe spring.

FIG. 424 is a side view of a footwear last showing toe spring, and with parts broken away.

FIG. 425 is a side view of a footwear last showing toe spring, and with parts broken away.

FIG. 426 is a side view of an upper including a removable strap including openings for accommodating lace closure means.

FIG. 427 is a side view of an upper including a removable strap including openings for accommodating lace closure means, and also a strap portion encompassing the posterior side of the upper.

FIG. 428 is a side view of an upper including a removable strap including VELCRO® hook and pile closure means.

FIG. 429 is a side view of an upper including a removable strap including VELCRO® hook and pile closure means, and also a strap portion encompassing the posterior side of the upper.

FIG. 430 is a side view of an upper including a removable strap including openings for accommodating lace closure means, and also a strap portion encompassing the posterior side of the upper.

FIG. 431 is a bottom plan view of a superior spring element including a posterior spring element, and an anterior spring element including a plurality of flex notches generally similar to that shown in FIG. 316 positioned in functional relation within an upper, and also showing a plurality of fasteners for selectively adjusting the width and girth of the upper.

FIG. 432 is a bottom plan view of an anterior outsole element including a hexagonal opening for accommodating a fastener.

FIG. 433 is a bottom plan view of an anterior outsole element including a triangular opening for accommodating a fastener, and also having a different configuration or last shape than the embodiment shown in FIG. 432.

FIG. 434 is a bottom plan view of an anterior outsole element including a hexagonal opening for accommodating a fastener, a plurality of flex notches, and an extended backing portion.

FIG. 435 is a bottom plan view of an anterior outsole element including a triangular opening for accommodating

a fastener, a plurality of flex notches, and also having a different configuration or last shape than the embodiments shown in FIGS. 432-434.

FIG. 436 is a bottom plan view of an anterior outsole element including a backing portion that can extend substantially full length between the anterior side and posterior side of an upper for an article of footwear.

FIG. 437 is a bottom plan view of a gasket for possible use between an anterior outsole element and an upper.

FIG. 438 is a side view of an anterior outsole element having a generally planar configuration.

FIG. 439 is a side view of an anterior outsole element including an elevated stability element having a three dimensional wrap configuration.

FIG. 440 is a bottom plan view of an anterior outsole element generally similar to that shown in FIG. 439.

FIG. 441 is a top plan view of an insole showing arrows indicating approximate positions of width and length measurements.

FIG. 442 is a top plan view of an insole having a substantially planar forefoot area.

FIG. 443 is a top plan view of an insole made of light-weight foam material including a cover layer made of a brushed textile material.

FIG. 444 is a top plan view of an insole made of an elastomer material having substantial dampening characteristics including a relatively smooth cover layer made of a textile material.

FIG. 445 is a top plan view of the insole shown in FIG. 444 further including a custom moldable bladder including a light cure material.

FIG. 446 is a bottom plan view of the insole shown in FIG. 444 further including a custom moldable bladder including a light cure material.

FIG. 447 is a top plan view of an insole having a three dimensional wrap configuration in the forefoot area.

FIG. 448 is a side cross-sectional view of an insole having a three dimensional wrap configuration in the forefoot area, midfoot area, and rearfoot area.

FIG. 449 is a top plan view of an insole having an opening in the rearfoot area.

FIG. 450 is a longitudinal cross-sectional side view of an article of footwear including a bladder, and also a superior spring element and an inferior spring element that are made as a single integral part.

FIG. 451 is a longitudinal cross-sectional side view of an article of footwear including a bladder, and also a superior spring element and an inferior spring element that are made separately, but later affixed together permanently to form a single integral part.

FIG. 452 is a longitudinal cross-sectional side view of an article of footwear including a bladder, and also a selectively removable and replaceable inferior spring element.

FIG. 453 is a longitudinal cross-sectional side view of an article of footwear including a bladder, and a superior spring element and an inferior spring element that are made as a single integral part.

FIG. 454 is a longitudinal cross-sectional side view of an article of footwear including a bladder, and also a selectively removable and replaceable inferior spring element.

FIG. 455 is a longitudinal cross-sectional side view of an article of footwear including a superior spring element and an inferior spring element that are made as a single integral part.

FIG. 456 is a longitudinal cross-sectional side view of an article of footwear including a superior spring element and

an inferior spring element that are made separately, but later affixed together permanently to form a single integral part.

FIG. 457 is a longitudinal cross-sectional side view of an article of footwear including a selectively removable and replaceable inferior spring element.

FIG. 458 is a medial side view of an upper of an article of footwear including a strap that is held in position by a retainer on the superior side.

FIG. 459 is a lateral side view of the upper of an article of footwear shown in FIG. 458.

FIG. 460 is a medial side view of an upper of an article of footwear including a strap generally similar to that shown in FIG. 458, but further including an integral strap portion that encompasses the posterior side of the upper.

FIG. 461 is a lateral side view of the upper of an article of footwear shown in FIG. 460.

FIG. 462 is a lateral side view of an upper of an article of footwear that includes a strap made from a resilient and elastomeric material.

FIG. 463 is a longitudinal cross-sectional lateral side view of an article of footwear that includes two bladders, and a selectively removable and replaceable spring element.

FIG. 464 is a longitudinal cross-sectional lateral side view of an article of footwear that includes two bladders generally similar to that shown in FIG. 463, but not including a plurality of fasteners.

FIG. 465 is a lateral side view of an article of footwear including an upper and strap generally similar to that shown in FIGS. 458-459, and also including selectively removable and replaceable components.

FIG. 466 is a longitudinal cross-sectional side view of the article of footwear shown in FIG. 465.

FIG. 467 is an exploded longitudinal cross-sectional side view of the article of footwear shown in FIGS. 465-466.

FIG. 468 is a lateral side view of an article of footwear including an upper and strap generally similar to that shown in FIGS. 458-459, and also including selectively removable and replaceable components.

FIG. 469 is a longitudinal cross-sectional side view of the article of footwear shown in FIG. 468.

FIG. 470 is an exploded longitudinal cross-sectional side view of the article of footwear shown in FIGS. 468-469.

FIG. 471 is a lateral side view of an article of footwear including an upper and strap generally similar to that shown in FIGS. 458-459, and also including selectively removable and replaceable components.

FIG. 472 is a longitudinal cross-sectional side view of the article of footwear shown in FIG. 471.

FIG. 473 is an exploded longitudinal cross-sectional side view of the article of footwear shown in FIGS. 471-472.

FIG. 474 is a side view of an article of footwear including a spring element including a superior spring element and an inferior spring element, and having a flexural axis located in the forefoot area.

FIG. 475 is a longitudinal cross-sectional side view of the article of footwear shown in FIG. 474.

FIG. 476 is a longitudinal cross-sectional side view of an article of footwear generally similar to that shown in FIG. 475, but the superior spring element further includes an integral heel counter in the rearfoot area that extends into midfoot area, and a portion of the forefoot area.

FIG. 477 is a longitudinal cross-sectional side view of an article of footwear generally similar to that shown in FIG. 475, but the superior spring element further includes an integral heel counter in the rearfoot area that extends into midfoot area, and a portion of the forefoot area.

FIG. 478 is a side view of an article of footwear generally similar to that shown in FIG. 474, but including an inferior

spring element having downward curvature posterior of the flexural axis, and upwards curvature near the posterior end of the inferior spring element.

FIG. 479 is a side view of an article of footwear generally similar to that shown in FIG. 478, but having a superior spring element that is affixed in functional relation by adhesive to the exterior of the upper.

FIG. 480 is a longitudinal cross-sectional side view of an article of footwear generally similar to that shown in FIG. 479, but further including an internal stability element, whereby the upper can instead be affixed in functional relation to the superior spring element by mechanical means.

FIG. 481 is a side view of an article of footwear generally similar to that shown in FIG. 480, but including an anterior spacer having a gently rounded shape on the posterior side.

FIG. 482 is a longitudinal cross-sectional side view of an article of footwear including two fluid-filled bladders, and an outsole that extends substantially full length between the posterior side and the anterior side of the article of footwear.

FIG. 483 is a longitudinal cross-sectional side view of an article of footwear including a plurality of foam cushioning elements, and an outsole that extends substantially full length between the posterior side and the anterior side of the article of footwear.

FIG. 484 is a longitudinal cross-sectional side view of an article of footwear including a midsole between the upper and superior side of the spring element in the rearfoot area, and also between the inferior side of the spring element and the outsole in the forefoot area.

FIG. 485 is a longitudinal cross-sectional side view of an article of footwear including a midsole between the upper and superior side of the spring element in the rearfoot area, midfoot area, and forefoot area, and also between the inferior side of the spring element and the outsole in the forefoot area.

FIG. 486 is a longitudinal cross-sectional side view of an article of footwear including a midsole between the upper and superior side of the spring element in the rearfoot area, midfoot area, and forefoot area.

FIG. 487 is a longitudinal cross-sectional side view of an article of footwear including a midsole in the forefoot area between the inferior side of the spring element and the outsole.

FIG. 488 is a longitudinal cross-sectional side view of a boot including a spring element.

FIG. 489 is a longitudinal cross-sectional side view of an article of footwear including an anterior outsole element including a web portion.

FIG. 490 is an exploded longitudinal cross-sectional side view of the article of footwear shown in FIG. 489.

FIG. 491 is a longitudinal cross-sectional side view of an article of footwear including an anterior outsole element having an undercut portion.

FIG. 492 is an exploded longitudinal cross-sectional side view of the article of footwear shown in FIG. 491.

FIG. 493 is a longitudinal cross-sectional side view of an article of footwear including an anterior outsole element including a web portion that is affixed to the exterior of the upper.

FIG. 494 is a longitudinal cross-sectional side view of an article of footwear including an anterior outsole element including a backing that is affixed to the exterior of the upper.

FIG. 495 shows multiple views of a prior art snap rivet.

FIG. 496 shows multiple views of a prior art push rivet.

FIG. 497 is a perspective view of a prior art full-hex blind threaded insert which can possibly be used as the female part of a fastener.

FIG. 498 is a side view of the prior art full-hex blind threaded insert shown in FIG. 497.

FIG. 499 is a top view of the prior art full-hex blind threaded insert shown in FIG. 497.

FIG. 500 is a perspective view of a male part of a fastener for possible use with the female part of a fastener shown in FIGS. 497-499.

FIG. 501 is a medial side view of an article of footwear including a three quarter length superior spring element and external heel counter.

FIG. 502 is a medial side view of an article of footwear including a full length superior spring element and external heel counter.

FIG. 503 is a medial side view of an article of footwear including a full length superior spring element including an anatomical three dimensional cupped shape, and also external heel counter.

FIG. 504 is a top plan view of a generally planar superior spring element similar to that shown with dashed lines in FIG. 502 for use in an article of footwear.

FIG. 505 is a top plan view of the inferior spring element shown in FIGS. 501-503.

FIG. 506 is a medial side view of an article of footwear including a three quarter length superior spring element, and an inferior spring element that extends rearward substantially beyond the posterior side of the upper.

FIG. 507 is a medial side view of an article of footwear including a full length superior spring element, and an inferior spring element that extends rearward substantially beyond the posterior side of the upper.

FIG. 508 is a medial side view of an article of footwear including a full length superior spring element including an anatomical three dimensional cupped shape, a fluid-filled bladder, and an inferior spring element that extends rearward substantially beyond the posterior side of the upper.

FIG. 509 is a medial side view of an article of footwear including a fluid-filled bladder that extends between the midfoot and forefoot areas, and an inferior spring element that extends rearward substantially beyond the posterior side of the upper.

FIG. 510 is a medial side view of an article of footwear including a removable middle outsole element or stabilizer that is affixed to a fluid-filled bladder, and an inferior spring element that extends rearward substantially beyond the posterior side of the upper.

FIG. 511 is a top plan view of a superior spring element for possible use in an article of footwear generally similar to that shown in FIG. 507.

FIG. 512 is a top plan view of a superior spring element including flex notches on the lateral side for possible use in an article of footwear generally similar to that shown in FIG. 507.

FIG. 513 is a top plan view of a three quarter length superior spring element including flex notches on the lateral side for possible use in the articles of footwear shown in FIGS. 501 and 506.

FIG. 514 is a top plan view of a superior spring element including flex notches on the lateral side and also a three dimensional cupped shape in the rearfoot area for possible use in an article of footwear generally similar to that shown in FIG. 508.

FIG. 515 is a top plan view of the inferior spring element shown in FIGS. 506-510, and 519.

FIG. 516 is an enlarged medial side view of the inferior spring element shown in FIG. 515.

FIG. 517 is a medial side view of an alternate inferior spring element generally similar to that shown in FIGS. 515-516, but including a laminate structure.

FIG. 518 is a medial side view of an alternate inferior spring element generally similar to that shown in FIGS. 517, but including a laminate structure and having a tapered configuration near the posterior side.

FIG. 519 is a medial side view of an article of footwear generally similar to that shown in FIG. 510, but also including a fluid-filled bladder between the inferior side of the upper and superior side of the inferior spring element. FIG. 520 is a side view of an engineering drawing of an inferior spring element.

FIG. 521 is a side view of an engineering drawing of an inferior spring element generally similar to that shown in FIG. 520, but having a tapered posterior portion.

FIG. 522 is a side view of an engineering drawing of an inferior spring element generally similar to that shown in FIG. 520, but having a curved posterior portion.

FIG. 523 is a top plan view of an inferior spring element generally similar to that shown in FIGS. 505 and 520, but showing several features of the inferior spring element in greater detail.

FIG. 524 is a lateral side view of an article of footwear including an external heel counter, and a spring element including a superior spring element shown with phantom dashed lines and an inferior spring element.

FIG. 525 is a medial side view of the article of footwear shown in FIG. 524.

FIG. 526 is a side view engineering drawing showing the dimensions of an inferior spring element for possible use with an article of footwear such as that shown in FIGS. 524 and 525.

FIG. 527 is a bottom plan view of the inferior spring element shown in FIGS. 524 and 525.

FIG. 528 is a rear view of an article of footwear generally similar to that shown in FIGS. 524 and 525.

FIG. 529 is a front view of the inferior spring element shown in FIG. 527.

FIG. 530 is a top plan view of the inferior spring element shown in FIG. 527.

FIG. 531 is a bottom plan view of the external heel counter shown in FIGS. 524, 525 and 528.

FIG. 532 is a top plan view of a superior spring element for possible use with an article of footwear having a longitudinal flex notch and two flex notches on the lateral side.

FIG. 533 is a lateral side view of the superior spring element shown in FIG. 532.

FIG. 534 is a top plan view of a superior spring element for possible use with an article of footwear having a longitudinal flex notch and three flex notches on the lateral side.

FIG. 535 is a lateral side view of the superior spring element shown in FIG. 534.

FIG. 536 is a top plan view of a superior spring element for possible use with an article of footwear having a longitudinal flex notch and two flex notches on the lateral side that straddle the position corresponding to the metatarsals-phalangeal joints of a wearer's foot.

FIG. 537 is a lateral side view of the superior spring element shown in FIG. 536.

FIG. 538 is a top plan view of a superior spring element for possible use with an article of footwear having two flex notches on the lateral side.

FIG. 539 is a lateral side view of the superior spring element shown in FIG. 538.

FIG. 540 is a lateral side view of an article of footwear including a superior spring element shown in phantom dashed lines and an inferior spring element.

FIG. 541 is a medial side view of the article of footwear shown in FIG. 540.

FIG. 542 is a lateral side view of an article of footwear including a superior spring element including an integral heel counter shown in phantom dashed lines and an inferior spring element.

FIG. 543 is a medial side view of the article of footwear shown in FIG. 542.

FIG. 544 is a rear view of the article of footwear shown in FIGS. 542 and 543.

FIG. 545 is a top plan view of a superior spring element having an integral heel counter for possible use in an article of footwear generally similar to that shown in FIGS. 542, 543, and 544.

FIG. 546 is a lateral side view of the superior spring element shown in FIG. 545.

FIG. 547 is a lateral side view of an article of footwear including a superior spring element including an integral external heel counter and an inferior spring element.

FIG. 548 is a medial side view of the article of footwear shown in FIG. 547.

FIG. 549 is a top plan view of a superior spring element including an integral external heel counter for possible use with an article of footwear generally similar to that shown in FIGS. 547 and 548.

FIG. 550 is a lateral side view of an article of footwear including an inferior spring element having asymmetrical curvature on the medial and lateral sides.

FIG. 551 is a medial side view of the article of footwear shown in FIG. 550.

FIG. 552 is a lateral side view of an article of footwear having parts broken away showing the anterior outsole element affixed directly to the upper.

FIG. 553 is a lateral side view of an article of footwear having parts broken away showing portions of an anterior outsole element passing through openings in the inferior side of the upper.

FIG. 554 is a bottom plan view of an upper having a plurality of openings for permitting portions of an anterior outsole element to pass therethrough.

FIG. 555 is a lateral side view of an article of footwear including an anterior outsole element having an integral stability element.

FIG. 556 is a longitudinal cross-sectional side view of an insole including an elevated heel pad for possible use with an article of footwear.

FIG. 557 is a longitudinal cross-sectional side view of an insole including an elevated heel pad, toe pad, and also an elevated side pad for encompassing a wearer's foot.

FIG. 558 is a lateral side view of an article of footwear having parts broken away showing the possible use of an anterior outsole element including a backing further including an external stability element that includes upwardly extending straps for use with closure means such as laces, straps, and the like.

FIG. 559 is a lateral side view of an article of footwear having parts broken away showing the possible use of an anterior outsole element including a backing further including an external stability element that includes upwardly extending straps for use with closure means such as laces, straps, and the like.

FIG. 560 is a top plan view of the male part of a fastener for possible use with an article of footwear showing both Allen drive and flat blade drive receptacles.

FIG. 561 shows a side view of the male part of a fastener shown in FIG. 560.

FIG. 562 shows a side view of a female part of a fastener for possible use with the male part of a fastener shown in FIGS. 560 and 561.

FIG. 563 is a bottom plan view of the female part of a fastener shown in FIG. 562.

FIG. 564 is a side view engineering drawing showing the dimensions of an inferior spring element for possible use with an article of footwear such as that shown in FIGS. 524 and 525.

FIG. 565 is a bottom plan view of a semi-curve lasted article of footwear including an inferior spring element and a posterior outsole element including a transparent backing portion.

FIG. 566 is a bottom plan view of a semi-curved lasted article of footwear including a posterior outsole element that substantially covers the bottom side of an inferior spring element.

FIG. 567 is a bottom plan view of an article of footwear having a straight lasted configuration relative to those shown in FIGS. 565 and 566, and also a wider inferior spring element and posterior outsole element in the midfoot area.

FIG. 568 is a lateral side view of an article of footwear generally similar to that shown in FIG. 524, further including a fluid-filled bladder.

FIG. 569 is a medial side view of an article of footwear generally similar to that shown in FIG. 525, further including a posterior outsole element generally similar to that shown in FIGS. 566 and 567 which also serves as a stabilizer.

FIG. 570 is a lateral side view of an article of footwear including an upper that is substantially made using three dimensional and/or circular knitting methods.

FIG. 571 is a medial side view of an article of footwear including an upper that is substantially made using three dimensional and/or circular knitting methods, further including an overmolded plastic material.

FIG. 572 is a lateral side view of a portion of an upper that is substantially made using three dimensional and/or circular knitting methods.

FIG. 573 is a lateral side view of the portion of an alternate upper generally similar to that shown in FIG. 572, but showing a different structure and parts broken away.

FIG. 574 is a lateral side view of the portion of an upper shown in FIG. 573, further including several straps and an external stability element consisting of an overmolded plastic material.

FIG. 575 is a lateral side view of an article of footwear including the upper shown in FIG. 574.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The article of footwear taught in the present invention includes a spring element which can provide improved cushioning, stability, and running economy. Unlike the conventional foam materials presently being used by the footwear industry, a preferred spring element is not substantially subject to compression set degradation and can provide a relatively long service life. The components of the article of footwear including the upper, insole, spring element, and sole can be selected from a range of options, and can be easily removed and replaced, as desired. The present invention also teaches an article of footwear including means for adjusting the length, width, girth and foot shape. Further, the relative configuration and functional relationship as between the forefoot, midfoot and rearfoot areas of the article of footwear can be readily modified and adjusted. Accordingly,

the article of footwear can be customized by a wearer or specially configured for a select target population in order to optimize desired performance criteria. Moreover, the present invention teaches a novel method of manufacturing an article of footwear, and also, a novel way of doing both retail and Internet business.

FIG. 1 is a medial side view of an article of footwear 22 including a spring element 51 consisting of at least two portions, a superior spring element 47 and an inferior spring element 50. The portions of spring element 51 can be integrally formed in a single component, but can alternately be formed in at least two parts which can be affixed together by adhesives. Preferably, the superior spring element 47 is capable of being removably affixed in functional relation to the inferior spring element 50, upper 23, and sole 32 with the use mechanical engagement means, including at least one mechanical fastener 29.

A mechanical fastener 29 can be made, e.g., of metal, ceramic, composite, thermoplastic, or thermoset materials. Threaded nuts and bolts, rivets, pop-rivets, push-rivets, snap rivets, snaps, hooks, clips, mating male and female structures, quarter turn fasteners, bayonet style fasteners, quick-release fasteners, and the like, can be used as a fastener. Preferred metals for use in a fastener can include aluminum, stainless steel, titanium, zinc coated steel, and other metals or treatments that are resistant to substantial degradation caused normal oxidation and corrosion. Thermoplastic snap-rivets 151 and push rivets 152 made and distributed by Richco, Inc. of Chicago, Ill. are shown in FIGS. 481-482. A large variety of fasteners are made, e.g., by Penn Engineering & Manufacturing Corporation of Dumbarton, Pa., Avibank Manufacturing, Inc. of Burbank, Calif., Atlas Engineering of Kent, Ohio, Stayfast Products, Inc. of Fort Mill, S.C., DFS International, Inc. of Orlando, Fla., and Fairchild, Inc. of Simi Valley, Calif. Shown in FIG. 483 is a standard full hex blind threaded insert 153 made by Atlas Engineering, Inc., and similar configurations are also available from Stayfast Products, Inc. Armand Savoie of MacNeill Engineering of Marlborough, Mass. is the inventor of so-called "Q-lock" fasteners taught in U.S. Pat. No. 6,151,805, and U.S. Pat. No. 6,332,281, and these patents are hereby being incorporated by reference herein. Fasteners having a threaded portion which further include a portion that can be collapsed or crimped in order to grip a portion of a structure into which they are being fitted are known in the prior art. When a thermoplastic material is used, a fastener can possibly be formed or affixed in position with the use of heat and pressure, welding, adhesive, polymerization, and then later be removed by destructive method or again with the use of heat and pressure. For example, the distal end of a male portion of a fastener can be melted and formed into a rivet like shape with the use of heat and pressure. When a thermoset material is used, a fastener can possibly be formed or affixed in position with the use of heat and pressure, polymerization, vulcanization, and later be removed with the use of heat and pressure, or destructive method. Contact adhesives and light cure adhesives can also be used to create or affix a fastener.

Preferably, a selectively removable and replaceable mechanical fastener 29 can be used, thus enabling some or all of the components of a spring element 51 and an article of footwear 22 to be removed and replaced, as desired. A fastener can include Allen head or star drive mechanical mating configurations for use with a like installation and removal tool. If desired, a fastener can also be torque limited so as to tighten to an appropriate and desired maximum torque value. So-called "smart bolts" developed for NASA

which are known by the tradename INTELLIGENT FASTENER® and made by Ultrafast, Inc. of Malvern, Pa. can be used. Fasteners known in the prior art having a male portion including threads that are coated with a thermoplastic or other locking material, or alternately, a fastener having a female portion including a thermoplastic or other locking material, can also be used in order to prevent loosening during use. Moreover, fasteners including mating male and female parts which can be easily and quickly coupled and released by so-called quarter turn, bayonet, or quick-release structures and methods can be advantageous for use. In this regard, the thickness of a superior spring element 47, inferior spring element 50, and upper 23 can be known, thus standardized or graded for various sizes of an article of footwear. Accordingly, it is possible to design and engineer fasteners 29 including mating male and female parts that can be easily and quickly coupled and released by so-called quarter turn, bayonet, or quick-release structures and methods. Moreover, alternate inferior spring elements 50 having different thicknesses within an engineered and preferred selected range can be accommodated and used, as desired.

Again, it can be readily understood that other conventional means can be used to affix the upper 23 in functional relation to the spring element 51 and outside 43, such as VELCRO® hook and pile, or other mechanical engagement means and devices. For example, as shown in FIG. 4, a portion of the posterior outsole element 46 can slip over and trap a portion of the inferior spring element 50 and then be secured with fastener 29. Further, at least one hook 27 can extend from the backing 30 of anterior outsole element 44 and engage a portion of the upper 23 or the superior spring element 47 as a portion of the outsole 43 is attached to a preffered article of footwear 22.

Again, published examples of devices and means for selectively and removably affixing various components of an article of footwear include, e.g., U.S. Pat. No. 2,183,277, U.S. Pat. No. 2,200,080, U.S. Pat. No. 2,220,534, U.S. Pat. No. 2,552,943, U.S. Pat. No. 2,588,061, U.S. Pat. No. 2,640,283, U.S. Pat. No. 2,873,540, U.S. Pat. No. 3,012,340, U.S. Pat. No. 3,818,617, U.S. Pat. No. 3,878,626, U.S. Pat. No. 3,906,646, U.S. Pat. No. 3,982,336, U.S. Pat. No. 4,103,440, U.S. Pat. No. 4,107,857, U.S. Pat. No. 4,132,016, U.S. Pat. No. 4,262,434, U.S. Pat. No. 4,267,650, U.S. Pat. No. 4,279,083, U.S. Pat. No. 4,300,294, U.S. Pat. No. 4,317,294, U.S. Pat. No. 4,351,120, U.S. Pat. No. 4,377,042, U.S. Pat. No. 4,535,554, U.S. Pat. No. 4,606,139, U.S. Pat. No. 4,807,327, U.S. Pat. No. 4,887,369, U.S. Pat. No. 5,042,175, U.S. Pat. No. 5,083,385, U.S. Pat. No. 5,317,822, U.S. Pat. No. 5,339,544, U.S. Pat. No. 5,410,821, U.S. Pat. No. 5,533,280, U.S. Pat. No. 5,542,198, U.S. Pat. No. 5,615,497, U.S. Pat. No. 5,628,129, U.S. Pat. No. 5,644,857, U.S. Pat. No. 5,657,558, U.S. Pat. No. 5,661,915, U.S. Pat. No. 5,678,327, U.S. Pat. No. 5,692,319, U.S. Pat. No. 5,729,916, U.S. Pat. No. 5,826,352, U.S. Pat. No. 5,896,608, U.S. Pat. No. 6,151,805, U.S. Pat. No. 6,247,249 B1, U.S. Pat. No. 6,282,814 B1, U.S. Pat. No. 6,324,772 B1, U.S. Pat. No. 6,332,281 B1, U.S. Pat. No. 6,349,486 B1, and application WO 02/13641 A1, all of these patents and patent applications hereby being incorporated by reference herein.

Also shown in FIG. 1 is an upper 23 including a heel counter 24, tip 25, vamp 52, anterior side 33, posterior side 34, medial side 35, top or superior side 37, bottom or inferior side 38, forefoot area 58, midfoot area 67, rearfoot area 68, midsole 26, a spring element 51 including an inferior spring element 50, an outsole 43 including an anterior outsole element 44 and posterior outsole element 46 having a tread or ground engaging surface 53, and the presence of toe

spring 62. The upper 23 can be made of a plurality of conventional materials known in the footwear art such as leather, natural or synthetic textile materials, paper or cardboard, stitching, adhesive, thermoplastic material, foam material, and natural or synthetic rubber. Since the various components of a preferred article of footwear 22 can be easily removed and replaced, a wearer can select a custom upper 23 having a desired size, shape, design, construction and functional capability. The article of footwear 22 can also include means for customizing the shape, width, and fit of the upper 23 such as taught in U.S. Pat. No. 5,729,912, U.S. Pat. No. 5,813,146, U.S. Pat. No. 6,442,874, B1, WO 99/24498 A2, and the like, the recited patents and patent application hereby being incorporated by reference herein. Further, the present invention teaches novel devices and methods for customizing the width, girth, and last or foot shape of the preferred article of footwear, as discussed in greater detail below. Moreover, the article of footwear 22 can include a custom insole 31 using light cure material as taught in the applicant's U.S. Pat. No. 5,632,057, and also patent application Ser. No. 10/234,508, entitled "Method of Making Custom Insoles and Point of Purchase Display, both of these documents hereby being incorporated by reference herein.

The upper 23 can be made with the use conventional patterns, materials, and means known in the prior art. Accordingly an upper 23 can include a natural or synthetic textile material 137 such as a woven or knit fabric, and the like. It can be readily understood that the textile material 137 can consist of a three dimensional textile material, a multi-layer textile material, water resistant or waterproof materials, shape memory textile materials, or stretchable and elastic textile materials, and the like. The textile material 137 included in the upper 23 can also be formed by three dimensional or circular knitting methods known in the prior art such as in the manufacture of socks, and a suitable pattern for use can be derived or cut therefrom.

Alternately, the textile material 137 forming at least a portion of the upper 23 can be made in the origami-like patterns taught in U.S. Pat. No. 5,604,997 granted to Dieter, U.S. Pat. No. 5,729,918 granted to Smets, U.S. Pat. No. 6,295,679 B1 granted to Chenevert, patent applications WO 02/13641 A1 by Long and WO 02/23641 A1 by Kilgore et al., and the like, all of these patents and patent applications being assigned to Nike, Inc. Further, the upper 23 can be made in accordance with the teachings of U.S. Pat. No. 6,237,251 granted to Litchfield et al., and also those of U.S. Pat. No. 6,299,962 granted to Davis et al., and the like, both of these patents being assigned to Reebok International, Ltd. In addition, generally similar to the teachings of U.S. Pat. No. 6,024,712 granted to Iglesias et al., the upper 23 can include a textile material that is overmolded with a thermoplastic material. All of the patents and patent applications recited in this paragraph are hereby incorporated by reference herein.

As shown in FIG. 349, the textile material 137 can be impregnated or overmolded with a plastic material 138 forming a stability element 136d, e.g., a relatively rigid thermoplastic material such as nylon, polyester, or polyethylene, or alternatively, an elastomeric thermoplastic material such as those made by Advanced Elastomer Systems that are recited elsewhere herein, a foam thermoplastic material, a rubber material, or a polyurethane material. The textile material 137 can be impregnated or overmolded while positioned in a substantially planar two dimensional orientation as shown in U.S. Pat. No. 6,299,962 granted to Davis et al., or alternately, while positioned in a relatively complex

three dimensional shape on a footwear last 80, mold, or the like. For example, stability element 136d shown in FIG. 349 can be made of a thermoplastic material or a polyurethane material that is directly injection molded and bonded to the upper 23.

Alternately, a foam material can be applied to the upper 23 as taught in U.S. Pat. No. 5,785,909 granted to Chang et al., and also U.S. Pat. No. 5,885,500 granted to Tawney et al., and the like, both patents being assigned to Nike, Inc., the recited patents hereby being incorporated by reference herein. The textile material 137 can possibly be impregnated or overmolded with the use of a spray, dipping, or roller application generally similar to that known in the screen-printing prior art. If the plastic material 138 is of the thermoplastic variety, it can then be caused to cool and take a set.

Alternately, a thermoset material which is used to impregnate or overmold the textile material 137 can be caused to cross-link by conventional means known in the prior art. As taught in the applicant's pending U.S. Ser. No. 09/570,171, filed May 11, 2000, light-cure materials which can be caused to set and cure upon exposure to a specific range of light frequency and wavelength having adequate power can also be used. When the inferior side 38 of the upper 23 includes a plurality of openings 72 for accommodating the passage of a plurality of traction members 115 associated with the anterior outside element 44 therethrough, it can be advantageous that the inferior side 38 of the upper 23 in the forefoot area 58, and possibly also that the midfoot area 67 and rearfoot area 68 be impregnated or overmolded by plastic material 138, or other suitable material. Alternately, the inferior side 38 of the upper 23 can be otherwise reinforced in order to enhance its structural integrity.

As shown in FIG. 350, the upper 23 can be made in general accordance with the so-called Huarache style commercialized by Nike, Inc. The textile material 137 can have resilient and elastic qualities, or alternatively, a rubber, neoprene foam rubber, polyurethane, or other material can be used in those areas of the vamp 52 and quarters 119 in which the location of a textile material 137 is indicated. In this regard, the textile material 137, or alternately, a substitute material having substantial elastic characteristics can extend into the collar area 122 in order to facilitate entry and exit of a wearer's foot. Accordingly, the upper 23 can in some footwear embodiments solely constitute the required and sufficient closure means for retaining a wearer's foot therein. Further, the upper 23 can include removable quarters including openings 72 and eyestays 139 for accommodating laces 121, straps 118, or other conventional closure means.

The upper 23 can also be made of new thermoplastic materials which have not yet been used to make articles of footwear that are biodegradable and environmentally friendly. For example, textile materials made from polylactic acid polymers derived from corn or other vegetation known by the trademark NATUREWORKS® fibers are presently under development and being commercialized by Cargill Dow Polymers LLC of Minneapolis, Minn. in cooperation with the Kanebo Corporation which is associated with the Itochu Corporation of Osaka, Japan. The physical and mechanical properties of fibers and thermoplastic materials derived from polylactic acid generally compare favorably with many existing fibers and thermoplastic materials, but unlike the vast majority of the synthetic fibers and thermoplastic materials presently being used in the manufacture of articles of footwear, those derived from polylactic acid are capable of substantially biodegrading when buried in the soil

over a period of two to three years. Moreover, other biodegradable and environmentally-friendly plastic materials and fibers can also be suitable for use.

As shown in FIG. 4, the anterior outsole element 44 and posterior outsole element 46 can include a backing 30 portion. The outsole 43 can be firmly secured in function relation to the upper 23 and spring element 51 with the use of at least one fastener 29. In an alternate embodiment, it is possible to configure the posterior outsole portion 46 such that a portion can slip over and trap the posterior side of the inferior spring element 50, and the posterior outsole element 46 can then be secured with at least one fastener 29 near the anterior side of the posterior outsole element 46 and inferior spring element 50. Since the posterior outsole element 46 consists of a resilient elastomer such as natural or synthetic rubber, during footstrike and the early portion of the braking phase of the gait cycle, the posterior outsole element 46 can become somewhat elongated and distended along the longitudinal or anterior to posterior axis and to lesser degree the medial to lateral or transverse axis, and this can further contribute to reducing the shock and vibration generated upon impact, as the forces and direction of loading during footstrike and the braking phase have not only vertical or z axis, but also x and y axis components.

The ground engaging portion 53 of the outsole 43 can be made of a natural or synthetic rubber material such as nitrile or styrene butadiene rubber, a thermoplastic material, an elastomer such as polyurethane, a hybrid thermoplastic rubber, and the like. Further, these materials can possibly be suitable for use when blown or foamed. Suitable hybrid thermoplastic and rubber combinations include dynamically vulcanized alloys which can be injection molded such as those produced by Advanced Elastomer Systems, 338 Main Street, Akron, Ohio 44311, e.g., SANTOPRENE®, VYRAM®, GEOLAST®, TREFSIN®, VISTAFLEX®, GEOLAST®, DYTROL XL®, and taught in the following Patents, e.g., U.S. Pat. No. 5,783,631, U.S. Pat. No. 5,779,968, U.S. Pat. No. 5,777,033, U.S. Pat. No. 5,777,029, U.S. Pat. No. 5,750,625, U.S. Pat. No. 5,672,660, U.S. Pat. No. 5,609,962, U.S. Pat. No. 5,591,798, U.S. Pat. No. 5,589,544, U.S. Pat. No. 5,574,105, U.S. Pat. No. 5,523,350, U.S. Pat. No. 5,403,892, U.S. Pat. No. 5,397,839, U.S. Pat. No. 5,397,832, U.S. Pat. No. 5,349,005, U.S. Pat. No. 5,300,573, U.S. Pat. No. 5,290,886, U.S. Pat. No. 5,177,147, U.S. Pat. No. 5,157,081, U.S. Pat. No. 5,100,947, U.S. Pat. No. 5,086,121, U.S. Pat. No. 5,081,179, U.S. Pat. No. 5,073,597, U.S. Pat. No. 5,070,111, U.S. Pat. No. 5,051,478, U.S. Pat. No. 5,051,477, U.S. Pat. No. 5,028,662, and U.S. Pat. No. RE 035398. SANTOPRENE® is known to consist of a combination of butyl rubber and ethylene-propylene. KRA-TON® thermoplastic elastomers made by the Shell Oil Corporation, DYNAFLEX® thermoplastic elastomers, and VERSAFLEX® thermoplastic elastomer alloys distributed by GLS Corporation of McHenry, Ill., can also be suitable for use. Further, the material compositions taught in both U.S. Pat. No. 6,342,544 B1 and U.S. Pat. No. 6,367,167 granted to Krstic et al. and assigned to Nike, Inc. can also be suitable for use, and these patents are hereby incorporated by reference herein.

The backing 30 portion of the outsole 43 can be made of a formulation of a thermoplastic material such as nylon, polyurethane, or SANTOPRENE® that is relatively firm relative to the ground engaging portion 53 of the outsole 43. For example, a polyurethane or SANTOPRENE® material having a hardness between 35-75 Durometer Asker C could be used on the ground engaging portion 53 of the outsole 43, whereas a polyurethane or SANTOPRENE® material hav-

ing a hardness between 75-100 Durometer on the Shore A or D scales could be used to make the backing 30 of outsole 43. A polyurethane backing 30 can be bonded to a polyurethane ground engaging portion 53 of outsole 43 or other material, or alternately, a SANTOPRENE® backing can be bonded to a SANTOPRENE® ground engaging portion 53 of outsole 43. This can be accomplished by dual injection molding, or over-molding of the like materials.

One advantage when using homogenous materials for the two portions of the outsole 43 concerns the affinity of like materials for effectively bonding together. Another advantage in using homogenous materials for the two portions of the outsole 43 concerns the "green" or environmentally friendly and recyclable nature of the component at the end of its service life. It is possible for the spent homogenous outsole 43 component including the backing 30 and ground engaging portion 53 to be recycled by the footwear manufacturer or by a third party, e.g., the outsole 43 can be re-ground into pieces and be thermoformed to make a portion of a new outsole 43 component. Further, the relative absence of adhesives in the manufacture of the outsole components and article of footwear taught in the present invention also makes for a "green" or environmentally friendly product. In contrast, conventional articles of footwear are commonly manufactured with the extensive use of adhesives for bonding a foam midsole to an upper and outsole. These adhesives are commonly non-environmentally friendly and can pose health hazards, and the resulting article of footwear cannot be so easily disassembled or recycled at the end of its service life. Moreover, the process associated with making conventional foam materials in making a midsole, and the blowing agents used therein, can be non-environmentally friendly and relatively energy inefficient as compared with conventional injection molding of thermoplastic materials, or the use of light cure materials and methods, as taught in the applicant's co-pending U.S. patent application Ser. No. 08/862,598 entitled "Method of Making a Light Cure Component For Articles of Footwear," hereby incorporated by reference herein. For example, instead of using large presses imparting both heat and pressure upon compression molds for effecting the cure of a midsole or outsole component over perhaps a seven minute cycle time, injection molding equipment and light cure technology can be used to reduce the cycle times to perhaps fractions of a second with relative energy efficiency and little or no waste product in a relatively environmentally friendly manufacturing environment. Accordingly, manufacturing can be located in the United States, or otherwise closer to the intended market.

It is also possible for heterogeneous materials to be used in making the backing 30 and ground engaging portion 53 of the outsole 43. For example, Advanced Elastomer Systems has developed a formulation of SANTOPRENE® which is capable of bonding to nylon. See also U.S. Pat. No. 5,709,954, U.S. Pat. No. 5,786,057, U.S. Pat. No. 5,843,268, and U.S. Pat. No. 5,906,872 granted to Lyden et al. and assigned to Nike, Inc. which relate to chemical bonding of rubber to plastic materials in articles of footwear, all of these patents hereby incorporated by reference herein. Further, in an alternate embodiment of the present invention, the backing 30 can simultaneously comprise at least a portion of the spring element 51 of the article of footwear 22, as shown in FIG. 16. In addition, the outsole 43 can also include desired lines of flexion 54. The following patents and some of the prior art recited therein contain teachings with respect to lines of flexion 54 in articles of footwear such as grooves, and the like: U.S. Pat. No. 5,384,973, U.S. Pat. No. 5,425,

184, U.S. Pat. No. 5,625,964, U.S. Pat. No. 5,709,954, U.S. Pat. No. 5,786,057, U.S. Pat. No. 4,562,651, U.S. Pat. No. 4,837,949, and U.S. Pat. No. 5,024,007, all of these patents being hereby incorporated by reference herein.

The use of a relatively soft elastomeric material having good dampening characteristics on the ground engaging portion 53 of an outsole 43 can contribute to enhanced attenuation of the shock and vibration generated by impact events. Relatively soft elastomeric materials having good dampening characteristics tend to have inferior abrasion and wear characteristics, and this can pose a practical limitation on their use in conventional articles of footwear constructed with the use of adhesives having non-renewable outsoles. However, the use of relatively soft elastomeric materials having good dampening characteristics does not pose a practical problem with respect to the preferred article of footwear 22 taught in the present application since the outsole 43 can be easily renewed and replaced. Accordingly, the preferred article of footwear 22 can provide a wearer with enhanced cushioning effects relative to many conventional articles of footwear.

The spring element 51 can be made of a resilient material such as metal, and in particular, spring steel or titanium. Titanium is widely used in the aerospace and automotive industries in part due to its excellent strength to weight ratio and durability. Titanium materials are available in three general categories depending upon their alloy content: alpha, that is, a material having a close packed hexagonal atomic arrangement, alpha/beta, and beta, that is, a material having a body centered cubic atomic arrangement. The preferred titanium alloys for use in a spring element 51 are those which can be characterized either as alpha/beta, or beta. Examples of suitable alpha/beta, or beta titanium alloys include "15-3" and "6-4" which can be obtained from TIMET<sup>®</sup>, Titanium Metals Corporation, of 403 Ryder Avenue, Vallejo, Calif. 94590, and also from President Titanium of Hanson, Mass. 02341.

The spring element 51 can alternately be made of a thermoplastic material, or alternately, a preferred fiber composite material. Glass fiber, aramid or KEVLAR<sup>®</sup> fiber, boron fiber, or carbon fiber composite materials can be used individually, or in partial or complete combination. Glass fiber composite materials are generally available at a cost of about \$5.00 per pound, whereas carbon fiber materials are generally available at a cost of about \$8.00-\$14.00 per pound. Glass fiber composite materials generally exhibit a lower modulus of elasticity or flexural modulus, thus less stiffness in bending as compared with carbon fiber materials, but can generally withstand more severe bending without breaking. However, the higher modulus of elasticity of carbon fiber composite materials can provide greater stiffness in bending, a higher spring rate, and reduced weight relative to glass fiber composite materials exhibiting like flexural modulus. Blends or combinations of glass fiber and carbon fiber materials are commonly known as hybrid composite materials.

Carbon fiber composite materials can be impregnated or coated with thermoplastic materials or thermoset materials. The modulus of elasticity or flexural modulus of some finished thermoplastic carbon fiber composite materials can be lower than that of some thermoset carbon fiber composite materials. For example, a sample of thermoplastic carbon fiber composite material having a relatively broad weave can have a flexural modulus in the range between 10-12 Ms, and in the range between 5-6 Ms in a finished part, whereas a "standard modulus" grade of thermoset impregnated unidirectional carbon fiber composite material can have a

flexural modulus in the range of 33 Ms, and in the range between 18-20 Ms in a finished part. Also available are "intermediate modulus" carbon fiber composite materials at approximately 40 Ms, and "high modulus" carbon fiber composite materials having a flexural modulus greater than 50 Ms and possibly as high as approximately 100 Ms. Accordingly, in order to achieve a desired flexural modulus or stiffness value, a thicker and heavier part made of a thermoplastic carbon fiber composite material can be required, that is, relative to a thermoset impregnated unidirectional carbon fiber composite material.

Impregnated carbon fiber composite materials are commonly known as "prepreg" materials. Such materials are available in roll and sheet form and in various grades, sizes, types of fibers, and fiber configurations, but also with various resin components. Various known fiber configurations include so-called woven, plain, basket, twill, satin, uni-directional, multi-directional, and hybrids. Prepreg carbon fiber composite materials are available having various flexural modulus, and generally, the higher is the modulus then the more expensive is the material. A standard modulus uni-directional prepreg peel-ply toughened carbon fiber composite material such as C2000, 33550, 150 GSM, having a 35 percent resin content, or alternately, "quick-cure" 2510 made by Zoltek Materials Group, Inc. of San Diego, Calif. 97121 can be suitable for use. This prepreg material can have a thickness of 0.025 mm or 0.01 inches including the peel-ply backing and in the range between 0.13-0.15 mm or 0.005 inches without. It is therefore relatively easy to predict the number of layers required in order to make a part having a known, target thickness, but one should also allow for a nearly 10 percent reduction in thickness of the part due to shrinkage during the curing process. The cost in bulk of a suitable unidirectional 33 Ms thermoset standard modulus carbon fiber composite material having a weight of approximately 150-300 grams per square meter made and distributed by Zoltek Materials Group, Inc. is presently approximately in the range between \$8.00 and \$9.00 per pound, and one pound yields approximately one square meter of material.

The required thickness of a spring element 51 and any possible sub-components can vary considerably depending upon, e.g., the materials being used, the construction and processing methods being used, the overall design and configuration of a particular part, the fastener(s) possibly being used, the intended activity or particular application, and also the weight, biomechanical technique, and characteristic running speed or velocity of an individual wearer. Nevertheless, the following information can serve as a broad guideline both when making and selecting a spring element 51 and any possible sub-components for use in an article of footwear. The superior spring element can have a thickness approximately in the range between 0.5-10.0 mm. The superior spring element can include an anterior spring element having a thickness approximately in the range between 0.5-2.5 mm, and in particular, in the range between 1.0-1.75 mm. It can be advantageous that the anterior spring element 48 maintain a thickness that is not much less than 1 mm in order to well distribute point loads, enhance robustness of the part, and to provide a noticeable performance enhancement. The superior spring element or posterior spring element can have a thickness in the rearfoot area approximately in the range between 1-10 mm, but when formed in a three dimensional cupped shape including a heel counter, can have a lesser thickness in the range between 1-5 mm. The inferior spring element can have a thickness approximately in the range between 3-10 mm.

The following more specific guidelines relate to an article of footwear including a spring element having relatively short lever arms which can provide approximately 10 mm of deflection generally resembling the embodiment represented in drawing FIGS. 1-4. The required thickness of the superior spring element 47 or anterior spring element 48 in the forefoot area 58 of an article of footwear intended for use in running when using standard modulus 33 Ms1 thermoset uni-directional prepreg carbon fiber composite material is then normally approximately in the range between 1.0-1.25 mm for an individual weighing 100-140 pounds running at slow to moderate speeds, approximately in the range between 1.25-1.50 mm for an individual weighing 140-180 pounds running at slow to moderate speeds, and in the range between 1.5-1.75 mm for an individual weighing 180-220 pounds running at slow to moderate speeds. When running at higher speeds, e.g., on a track and field surface, individuals generally prefer a thicker and stiffer plate relative to that selected for use at slow or moderate speeds. The perceived improvement in running economy can be on the order of at least one second over four hundred meters which corresponds to approximately two to three percent improvement in athletic performance. The superior spring element 47 or anterior spring element 48 can store energy when loaded during the latter portion of the stance phase and early portion of the propulsive phase of the running cycle, and then release that energy during the latter portion of the propulsive phase. A spring element can provide not only deflection for attenuating shock and vibration associated with impact events, but can also provide a relatively high level of mechanical efficiency by possibly storing and returning in excess of 70 percent of the energy imparted thereto. Accordingly, the spring to dampening ratio of the material of which the spring element is made can be expressed as being equal to or greater than 70/30 percent. In fact, a preferred uni-directional carbon fiber composite material or spring titanium material can return in excess of 90 percent of the energy imparted thereto during the materials test associated with test method ASTM 790. In contrast, most conventional prior art athletic footwear soles including foam midsoles and rubber outsoles have a spring to dampening ratio somewhere between 40 and 60 percent. The preferred article of footwear 22 can then afford a wearer with greater mechanical efficiency and running economy than most conventional prior art athletic footwear.

Further, unlike the conventional foam materials used in prior art articles of footwear such as ethylene vinyl acetate which can become compacted and take a compression set, the spring elements 51 used in the present invention are not substantially subject to compression set degradation due to repetitive loading. The degradation of conventional foam materials can cause injury to a wearer, as when a broken down midsole results in a wearer's foot being unnaturally placed in a supinated or pronated position as opposed to a more neutral position, or when a compacted foam midsole in the forefoot area 58 causes a wearer's metatarsals to drop out of normal orientation or to unnaturally converge. Further, the quality of cushioning provided by conventional foam materials such as ethylene vinyl acetate or polyurethane rapidly degrades as the material becomes compacted and takes a compression set. In contrast, the spring elements 51 taught in the present invention do not substantially suffer from these forms of degradation, rather provide substantially the same performance and geometric integrity after extended use as when new. Given an article of footwear including removable and replaceable components, in the event of a

fatigue or catastrophic failure of a spring element, the damaged part can simply be removed and replaced.

Again, given an article of footwear including a spring element generally resembling the embodiment represented in drawing FIGS. 1-4, the required thickness of a superior spring element 47, or posterior spring element 49 for the rearfoot area 68 of an article of footwear intended for running use when using standard modulus 33 Ms1 thermoset uni-directional prepreg carbon fiber composite material is approximately in the range between 2.0-5.0 mm, and in particular, is approximately in the range between 2.75-3.25 mm for an individual weighing in the range between 100-140 pounds, approximately in the range between 3.25-3.75 mm for an individual weighing in the range between 140-180 pounds, and approximately in the range between 3.75-4.25 for an individual weighing between 180-220 pounds. It can be advantageous for the sake of robustness that the thickness of the inferior spring element 50 be at least equal to or greater than that of the corresponding superior spring element 47 or posterior spring element 49 in the rearfoot area 68, as the inferior spring element 50 has a more complex curved shape and is subject to direct repetitive impact events. Accordingly, given an article of footwear including a spring element generally resembling the embodiment represented in drawing FIGS. 1-4, the required thickness of the inferior spring element 50 when using standard modulus 33 Ms1 thermoset uni-directional prepreg carbon fiber material is approximately in the range between 2.0-5.0 mm, and in particular, is approximately in the range between 2.75-3.25 mm for an individual weighing in the range between 100-140 pounds, approximately in the range between 3.25-3.75 mm for an individual weighing in the range between 140-180 pounds, and approximately in the range between 3.75-4.25 for an individual weighing between 180-220 pounds.

Different individuals can have different preferences with respect to the thickness and stiffness of various spring element components regardless of their body weight, and this can be due to their having different running styles or different habitual average running speeds. During normal walking activity the magnitude of the loads generated are commonly in the range between one to two body weights, whereas during normal running activity the magnitude of the loads generated are commonly in the range between two to three body weights. Accordingly, the flexural modulus of a spring element for use in an article of footwear primarily intended for walking can be reduced relative to an article of footwear intended for running, thus the thickness and/or stiffness of the spring element can be reduced. During a lateral movement and jumping sport such as basketball, the loads generated can be much higher and in the range between 2.5 and 10 body weights. Accordingly, greater stiffness and/or thickness can be required of a spring element 51 and any sub-component parts. As result it can sometimes be advantageous to introduce an additional cushioning medium or cushioning means such as a fluid-filled bladder and/or a foam material between a superior spring element 47 or posterior spring element 49 and an inferior spring element 50, and also between a superior spring element 47 or anterior spring element 48, and an anterior spring element 42.

When making spring elements using carbon fiber composite material, it is important to recognize that relatively slight variations in the configuration or design can have both substantial and subtle effects upon the exhibited stiffness, service life, and overall performance of the component. For example, consider the long bow, versus the recurve bow configuration used in archery. These two shapes provide

different stiffness characteristics when the bow is being drawn, and also when the arrow is released. For example, when the inferior spring element 50 is made in a sharper curved shape it can exhibit greater stiffness and a different stress/strain curve, that is, relative to when it is made in a more gentle curved configuration.

Again, given an article of footwear including a spring element generally resembling the embodiment represented in drawing FIGS. 1-4, the following constitutes an approximate guideline regarding the required thickness and stiffness of a superior spring element 47 or anterior spring element 48 made of standard modulus 33 MsI unidirectional carbon fiber composite material for use in the forefoot area 48 of a running shoe given a wearer's body weight and common perception. Again, much depends on an individual's body weight, running technique, speed, and the intended application. For example, an individual having a given body weight who happened to be a heavy heel striker would likely select an anterior spring element 48 having the next highest stiffness value. Likewise, an individual who habitually runs at a faster pace than another individual having a similar body weight and running technique might also select an anterior spring element 48 having the next highest stiffness value. Nevertheless, Table I shown below can provide guidance to runners making selections regarding a suitable spring element 51.

TABLE 1

Runner's Body Weight (pounds)							
Thickness (mm)	100	120	140	160	180	200	220
.75	S	VS	VS	VS			
1.0	M	S	S	S	VS		
1.25	H	M	M	S	S		
1.50	VH	H	H	M	M	S	
1.75		VH	VH	H	H	M	M
2.0				VH	VH	H	H
2.25					VH	VH	VH

## Key to Abbreviations

VS = Very Soft = Suitable For Long Slow Distance (LSD) Running  
Slower than 7.00 minutes/mile.  
S = Soft = Suitable For Running 600 minutes/mile.  
M = Medium = Suitable For Running sub-5.00 minutes/mile.  
H = Hard = Suitable For Running sub-60 seconds/400 meters.  
VH = Very Hard = Suitable For Short Sprints and Jumps.

Again, regarding the rearfoot area 68 of the superior spring element 47 or posterior spring element 49, the thickness of the part can vary considerably depending upon whether a relatively flat configuration, or alternately, a cupped shape anatomical configuration which possibly includes a curved midfoot area 67 including longitudinal and transverse arch support, medial and lateral side stabilizers, or a heel counter 24 is incorporated therein. Given a three dimensional cupped or anatomical shaped posterior spring element 49 including a heel counter, and an individual weighing between 100-200 pounds the minimum thickness required to achieve the desired robustness is believed to be approximately in the range between 1.0 and 1.5 mm. However, when a fastener 29 is used to affix the inferior spring element 50 to the superior spring element 47 or posterior spring element 49, even with the presence of a large washer or flange, a fastener 29 can still impart a relatively large point load, thus a minimum thickness of 2.5 mm in the area near the position of the fastener 29 can be required in order to ensure robustness.

Regardless, the upwardly extending portions of a posterior spring element 49 forming a heel counter 24 and also the

anterior edge of the part can generally be made to have a thickness in the range between 0.5-2.0 mm. It is believed to be advantageous for the purposes of commercialization to over-engineer the part with respect to load tolerance and robustness and to make the inferior side of the posterior portion of a superior spring element 47 or a posterior spring element 49, in not more than three or four different thicknesses: e.g., approximately 2.0 mm for the range between 100-140 pounds body weight; approximately 2.5 mm for the range between 140-180 pounds body weight; and, approximately 3.0 mm for the range between 180-220 pounds body weight.

It can be helpful to provide guidance regarding the stiffness characteristics associated with various portions of a spring element 51, e.g., S (soft), M (medium), and H (hard), VH (very hard) UH (ultra hard), or to otherwise identify suitable performance criteria by specific event, player position, and the like. One way of expressing the relationship between superior spring elements 47 or posterior spring elements 49 having a three dimension cupped shape including a heel counter which are made in one of three different thickness in the rearfoot area 68, and the possible use of five different alternate thickness in the forefoot area 58 of the superior spring element 47 or an anterior spring element 48 in a running shoe suitable for use in track and field is shown in Table 2 below.

TABLE 2

Thickness in Rearfoot Area (mm)	Runner's Weight & Posterior Spring Thickness in Forefoot Area (mm)					
	3D Part (mm)	1.0	1.25	1.5	1.75	2.0
2.0 (100-140 lbs)	LSD	5k-10k	800/1500	Sprints		
2.5 (140-180 lbs)	LSD	5k-10k	800/1500	Sprints	Sprints	
3.0 (180-220 lbs)	LSD	LSD	5k-10k	800/1500	Sprints	

Regarding the amount of deflection in the rearfoot area 68 associated with the superior spring element 47 or posterior spring element 49, if and when the superior spring element 47 or posterior spring element 49 is made in a three dimensional cupped shape possibly including a heel counter 24, then not much deflection will take place, e.g., normally something in the range between 0-2.0 mm. It is important to recognize that if the superior spring element 47 or posterior spring element 49 is made in a three dimensional cupped shape including a heel counter that only permits something in the range between 0-2.0 mm of deflection, then this can place a larger load and requirement for deflection upon the inferior spring element 50. Accordingly, all things being equal, the inferior spring element 50 could then have to be made thicker and/or stiffer. Nevertheless, if and when the superior spring element 47 or posterior spring element 49 is substantially flat and planar, and the inferior spring element 50 is curved, but both parts have about the same thickness, then the inferior spring element 50 will generally still exhibit the most deflection. However, the superior spring element 47 or posterior spring element 49 will also account for a portion of the total deflection. In the abstract, if the parts are engineered so as to permit 10 mm of total deflection, then the inferior spring will normally account for at least half, and perhaps nearer to three quarters of the deflection, before the two parts would meet and "bottom out" the mechanical

system. Here, a great deal depends upon the design and manufacture of the parts, the application, and the wearer's body weight and technique.

Given a running shoe used in a typical linear running motion, even 4–6 mm of deflection of the superior spring element 47 or posterior spring element 49 in the rearfoot area 68 will not pose a biomechanical or stability problem provided that the article of footwear is designed properly. It should be noted that the fat pad on the human heel is known to commonly deflect approximately in the range between 8–10 mm, and also the longitudinal arches of many individuals are known to commonly deflect in the range between 2–6 mm. Moreover, in existing conventional articles of footwear including foam midsoles equal to or greater than 4–6 mm of deflection commonly takes place on both the top and bottom sides of the sole during a rearfoot impact event.

A question can be raised concerning the possibility of 4–6 mm of deflection taking place at the lateral rear corner, that is, deflection having a torsional component. If a line 80 mm in length is drawn representing the width of the bottom net of the outside 43 of a typical running shoe sole in the rearfoot area 68, and then a line 6 mm high is drawn perpendicular to and intersecting the line having a length of 80 mm at the end on the lateral side, the resulting angle as measured from the opposite side of the line having a length of 80 mm is only approximately five degrees. This does not degrade stability since the feet of most individuals are normally supinated approximately 7–8 degrees upon footstrike when running barefoot on grass, and substantial rotative movements commonly take place between the rearfoot and forefoot areas of an individual's foot during running activity. Further, the average runner commonly pronates approximately 7–8 degrees when running barefoot on grass, but double that magnitude of pronation can be associated with running in conventional prior art articles of footwear including foam midsoles. However, both the rate and magnitude of pronation can often be reduced by using an article of footwear made according to the present invention, that is, relative to a conventional prior art article of footwear. Moreover, it can possibly be advantageous to engineer an article of footwear including a spring element 51 intended for running so as to approximate the magnitude of supination upon footstrike, and also the subsequent magnitude and rate of pronation commonly observed when individuals run barefoot on natural grass. Nevertheless, it can be readily understood that the design and engineering of an article of footwear including a spring element 51 can have different requirements for other sport applications which include lateral and random movements.

Again, the required thickness of the inferior spring element 50 will depend in part upon whether the superior spring element 47 or posterior spring element 49 is contributing to deflection, and by how much, the design and composition of the inferior spring element 50, but also a wearer's body weight, biomechanical technique, and speed. For example, given an article of footwear including a spring element generally resembling the embodiment represented in FIGS. 1–4 which provides approximately 10 mm of total deflection, and a generally planar superior spring element 47 or posterior spring element 49 making a contribution to deflection of less than or equal to 5 mm and an individual running at slow to moderate speeds, the approximate required thickness of an inferior spring element 50 made of standard modulus 33 Msi carbon fiber composite material having a curved configuration and a diagonal flexural axis 59 is shown in Table 3 provided below.

If and when the superior spring element 47 or posterior spring element 49 has a three dimensional shape including a heel counter and therefore makes little or no contribution to deflection, that is, deflection in the range between 0–2.0 mm, then the inferior spring element 50 will generally need to be approximately at least 0.25–0.5 mm thicker in order to effectively manage the loading associated with greater deflection so as to not exceed approximately 60–66 percent of the inferior spring element's 50 maximum engineered load bearing capacity. This percentage represents an approximate threshold regarding the capability of carbon fiber composite materials to withstand cycling loading for hundreds of thousands or millions of cycles.

It is important to note that as the flexural axis 59 is rotated 15 from the transverse axis 91 oriented at 90 degrees to the longitudinal axis 69 and towards a 45 degree angle, the effective length of the flexural axis 59 and stiffness of the inferior spring element 50 can be increased. Further, when the superior spring element 47 or posterior spring element 20 49 and the inferior spring element 50 are being fabricated, it can be advantageous to position some of the layers of the carbon fiber material both consistent with and perpendicular to the orientation of the flexural axis 59, since this area can 25 function as a fulcrum point and be associated with high local function.

The length of the effective lever arms 60 and 61 of the superior spring element 47 or posterior spring element 49, and the inferior spring element 50 on the medial and lateral sides will also influence the stiffness of the larger spring element 51. Accordingly, it can be readily understood that scalar effects can be present with respect to widely varying sizes of articles of footwear. Again, given an article of footwear including a spring element generally resembling the embodiment represented in FIGS. 1–4 providing 35 approximately 10 mm of deflection and made of standard modulus 33 Msi carbon fiber composite material, the approximate required thickness of an inferior spring element 50 as a function of the body weight of a runner, and also the type of superior spring element 47 or posterior spring element 49 being used is shown in Table 3 below.

TABLE 3

Body Weight (lbs)	Superior/Posterior Spring Defects = 5 mm Thus, Inferior Spring Thickness (mm)		Superior/Posterior Spring Defects = 2.5 mm Thus, Inferior Spring Thickness (mm)	
	100	120	140	160
100	2.5–2.75			2.75–3.25
120		2.75–3.0		3.0–3.5
140			3.0–3.25	3.25–3.75
160			3.25–3.50	3.5–4.0
180			3.35–3.75	3.5–3.75
200			3.75–4.0	4.0–4.5
220			4.0–4.25	4.25–4.75

When the superior spring element 47 consists of a single part, the thickness can vary and be tapered from the posterior side 34 to the anterior side 33, that is, the part can gradually become thinner moving in the direction of the anterior side 33. This can be accomplished by reducing the number of layers during the building of the part and/or with the use of compressive force during the molding or curing process. When the superior spring element 47 consists of two parts, e.g., an anterior spring element 48 and a posterior spring element 49, the parts can be made in different thickness. Alternately, the posterior spring element 49 can be made of a higher modulus material having a given thickness, and the anterior spring element 48 can be made of a lower modulus

material having the same thickness, thus the two parts can possibly have the same thickness but nevertheless provide different and desired spring and dampening characteristics.

Alternately, the number of fiber composite layers, the type of fiber and resin composition of the layers, the inclusion of a core material, and the geometry and orientation of the layers, can be varied so as to create areas of differential stiffness in a spring element 51. For example, the inferior spring element 50 can project from the superior spring element 47 with the flexural axis 59 orientated consistent with a transverse axis, that is, at approximately 90 degrees with respect to the longitudinal axis 69 provided that the aforementioned variables concerning the fiber composite layers are suitably engineered so as to render the medial side 35 of the inferior spring element 50 approximately 2-3 times stiffer than the lateral side 36, that is, in an article of footwear intended for walking or running activity.

Further, the configuration of a spring element 51, and in particular, an inferior spring element 50 having an flexural axis 59 orientated at approximately 90 degrees with respect to the longitudinal axis 69, can be configured so as to provide differential stiffness. For example, a portion of a spring element 51 can include transverse or longitudinal slits, notches, openings, a core material, or reduced thickness so as to exhibit areas of differential stiffness, as shown in FIG. 10. Several configurations and methods for achieving differential stiffness in the midfoot area 67 or rearfoot area 68 of an article of footwear are recited in U.S. Pat. No. 5,875,567, this patent being hereby incorporated by reference herein. However, the relatively sharp portion of the spring element that is shown projecting beyond the medial side of the sole in U.S. Pat. No. 5,875,567 could possibly result in injury to the medial side of a wearer's opposite leg during running. Further, given the common orientation of the foot of a wearer who would be characterized as a rearfoot striker during footstrike, an inferior spring element 50 having an flexural axis 59 orientated consistent with transverse axis 91, that is, at 90 degrees with respect to the longitudinal axis 69, is generally not so advantageously disposed to receive repetitive loading and exhibit robustness during its service life relative to an inferior spring element 50 having an flexural axis 59 deviated from the transverse axis 91 in the range between 10 and 50 degrees, as shown in FIGS. 9 and 10. In this regard, the foot of a wearer characterized as a rearfoot striker is normally somewhat dorsiflexed, supinated and abducted during footstrike, as recited and shown in U.S. Pat. No. 5,425,184, and U.S. Pat. No. 5,625,964, these patents being hereby incorporated by reference herein. Accordingly, given an average individual having normal biomechanics who would be characterized as a rearfoot striker, it can be advantageous for the flexural axis 59 of the inferior spring element 50 to be deviated from the transverse axis 91 in the range between 20-30 degrees in footwear intended for walking or running. However, the flexural axis 59 of an inferior spring element 50 can be deviated from the transverse axis 91 in the range between 30-50 degrees in footwear intended for use by individuals who tend to more substantially pronate during the braking and stance phases of the gait cycle. Other teachings having possible merit relating to differential stiffness in the rearfoot area of an article of footwear include, e.g., U.S. Pat. No. 4,506,462, U.S. Pat. No. 4,364,189, U.S. Pat. No. 5,201,125, U.S. Pat. No. 5,197,206, and U.S. Pat. No. 5,197,207, all of these patents hereby being incorporated by reference herein.

In order to make carbon fiber composite spring elements, it can be advantageous to create a form or mold. The form or mold can be made of wood, composite material, metal,

and the like. For example, prototype forms or molds can be made of thin sheets of stainless steel which can be cut and bent into the desired configurations. The stainless steel can then be treated with a cleaner and appropriate release agent.

- 5 For example, the stainless steel can be washed with WATERCLEAN and then dried, then given two coats of SEALPROOF sealer and dried, and finally given two coats of WATERSHIELD release agent and dried, all of these products being made by Zyyax, Inc. of Boca Raton, Fla., and distributed by Technology Marketing, Inc. of Vancouver, Wash., and Salt Lake City, Utah. A "preprep" uni-directional carbon fiber composite material including a peel-off protective layer that exposes a self-adhesive surface can then be cut to the approximate shapes of the desired spring element
- 10 by a razor blade, scissors, cutting die, water jet cutter, or automatic cutting machine. Suitable carbon fiber composite materials for use include F3(C) 50K made by FORTAFIL, AS4C made by HEXCEL, T300 made by TORAY/AMOCO, and in particular, ZMG-2000-Z346-150-35-24"
- 15 which is a 150 GSM material including a toughened epoxy with a 35 percent resin content made by Zolek Materials Group, Inc., and the like. The individual layers of carbon fiber composite material can have a thickness in the range between approximately 0.13-0.15 mm or 0.005 inches and be affixed to one another to build the desired thickness of the spring elements, but allowing for a reduction of approximately 10 percent due to shrinkage which commonly takes place during the curing process. The individual layers can be alternated in various orientations, e.g., some can be oriented parallel to the length of the desired spring element, and others inclined at 45 degrees to the left or right, or at 90 degrees. The result can be a quasi-isotropic fiber composite material, that is, one having a relatively homogenous flexural modulus in all directions. However, the flexural modulus or stiffness in bending exhibited by the spring element in various orientations can be specifically engineered by varying the number, type, and orientation of the fiber composite layers.

- 20 Once the spring element components have been built by adhering the desired number, type, and orientation of glass or carbon fiber composite layers together, the spring element can be rolled or placed under pressure and applied to the stainless steel prototype form or mold. When making prototype spring elements, the carbon fiber composite lay-up including the stainless steel form or mold can be wrapped in a peel ply or perforated release film such as Vac-Pak E 3760 or A 5000 Teflon® FEP, then wrapped in a bleeder such as A 3000 Resin Bleeder/Breather or RC-3000-10A polyester which will absorb excess resin which could leach from the spring elements during curing. This assembly can then be enclosed in a vacuum bagging film, e.g., a Vak-Pak® Co-Extruded Nylon Bagging Film such as Vac-Pak HS 800 and all mating edges can be sealed with the use of a sealant tape such as Schnee Morehead vacuum bag tacky tape, or RAP RS200. A vacuum valve can be installed in functional relation to the vacuum bagging film before the vacuum bag is completely sealed. The vacuum valve can be subsequently connected to an autoclave vacuum hose and a vacuum pump, and the assembly can be checked for leaks before placing it in an oven for curing. The entire assembly, while under constant vacuum pressure, can then be placed into an oven and heated at a temperature of approximately 250 degrees Fahrenheit for one to two hours in order to effect setting and curing of the carbon fiber composite spring elements. Upon removal from the oven and cooling, the vacuum bag can be opened and the cured carbon fiber composite spring elements can be removed from within the bleeder and the peel

ply or release film, and separated from the stainless steel form or mold. The spring element parts can then possibly be cut or trimmed with a saw, a grinding wheel, a sander, a CNC machine, or with the use of water jet cutting equipment. The fasteners 29 can then be affixed and the spring element installed in functional relation to the upper and outsole of a prototype article of footwear.

The method of making fiber composite materials in a production setting differs depending upon whether thermoplastic or thermoset materials are being used. For example, thermoplastic carbon fiber composite materials including their resin coatings are commonly available in flat sheet stock. Parts can then be cut from these sheets using water jet cutting equipment. These parts can then be preheated for a short time in an oven in order to reach a temperature below, but yet relatively close to the melt point of the thermoplastic material, thus rendering the part moldable. Production compression molds are commonly made from aluminum, then polished and treated with a non-stick coating and release agent. The cost of a single aluminum production compression mold is approximately \$2,500. The heated thermoplastic carbon fiber composite parts can then be placed into a relatively cold compression mold and subjected to pressure as the part is simultaneously caused to set and cool. The parts can then be removed and inspected for possible use. One manufacturer of thermoset fiber composite parts is Performance Materials Corporation of 1150 Calle Suerte, Camarillo, Calif. 93012.

The production method and process is different when a thermoset carbon fiber composite uni-directional prepreg material is being used to make a desired part. The uncured layered thermoset part can be placed into an aluminum compression mold which has been preheated to a desired temperature. The mold is closed and the part is then subjected to both heat and pressure. In this regard, the set and cure time of thermoset fiber composite materials is temperature dependent. Generally, the set and cure time for thermoset parts will be about one hour given a temperature of 250 degrees Fahrenheit. However, it is often possible for the same thermoset parts to reach their gel state and take a set, whereupon the shape of the part will be stable, in about one half hour given a temperature of 270 degrees Fahrenheit, in about fifteen minutes given a temperature of 290 degrees Fahrenheit, or in about seven minutes given a temperature of 310 degrees Fahrenheit. Having once reached their gel state and taken a set, the thermoset parts can then be removed from the mold. The parts can later be placed in an oven and subjected to one to two hours of exposure to a temperature of 250 degrees Fahrenheit in order to complete the curing process. Moreover, Zoltek Materials Group, Inc. of San Diego, Calif. makes a "quick cure" thermoset material identified by their product code number 2510 which can completely cure in ten minutes given a mold temperature of 250 degrees Fahrenheit, and perhaps even faster at higher temperatures.

An alternate method of making thermoset carbon fiber composite spring element components involves making and using a single sided mold having sufficient width to encompass at least one part along the x axis, but the mold can then extend along the y axis for many feet, or vice-versa. For example, the mold can be made of 7075 grade aluminum which can be purchased from Metals USA, Specialty Metals Northwest, Inc. at 3400 S.W. Bond Avenue, in Portland, Oregon. The mold can have a width of 16 inches, a length of 30 inches, and maximum thickness of 1/4 inches, and be machined to provide a desired configuration using CNC equipment. Accordingly, a relatively long lay-up of

carbon fiber material can be placed upon the mold, vacuum bagged, and then cured in an autoclave. For example, ZMG-2000-Z346-150-35-24" which is a 150 GSM prepreg carbon fiber material including a toughened epoxy with a 35 percent resin content made by Zoltek Materials Group, Inc. can be used. A thicker material such as 300 GSM prepreg carbon fiber material can be used alone, or alternately, in combination with a 150 GSM material in order to more rapidly build up the thickness of the desired part. A large number of individual components can then be cut from the resulting cured sheet of carbon fiber material. For example, approximately seven full-length superior spring element 47 parts can be obtained from a sheet of carbon fiber composite material formed upon mold having the size recited above. Alternately, approximately fourteen inferior spring elements 50 can be obtained from a sheet of carbon fiber composite material formed upon a mold having the size recited above. The individual parts can be cut with a saber saw, a CNC machine using a vacuum fixture for holding the cured sheet of carbon fiber composite material, or with a multi-dimensional water jet cutter. A provider of water jet cutting services is Hegar Manufacturing of 15600 S.E. FOR/MOR, Clackamas, Oreg. A superior spring element or anterior spring element having a planar configuration, or alternately, a curved shape can be made by this method. Moreover, an inferior spring element having more dramatic curved shape can be made by this method.

An alternate method of making carbon fiber composite parts involves using an injection mold. An uncured carbon fiber material which may or may not already be impregnated with a resin can be placed into an injection mold, and resin can then be injected under pressure and subsequently cured to form a finished part. Alternately, a resin containing short or long glass, carbon, or boron fibers can be injected into a mold and caused to set. The compression and injection mold methods of making fiber composite parts can be advantageous for use when attempting to make components having multiple complex curved shapes. Manufacturers of thermoset fiber composite parts include All Composites of 3206 232nd Street, East Spanaway, Wash. 98387, and Quatro Composites of 12544 Kirkham Court, No. 16, Poway, Calif. 92064.

Alternative methods of making fiber composite parts can include the use of light cure technology, other forms of compression and/or injection molding, reaction injection molding, and also pultrusion. Compression molding, injection molding, and reaction injection molding have been widely used in the automotive industry, e.g., the body of the Corvette largely consists of fiber composite construction. Thermoplastic materials, or alternately, thermoset materials including polymers, resins, or epoxies which are rubber toughened that further include glass fiber, aramid fiber, carbon fiber, or boron fiber materials, and the like, can possibly be used. For example, Dow Chemical Company of Midland, Mich. makes SPECTRUM® reaction moldable polymer which has been used to make automobile body parts, and LNP Engineering Plastics of Exton, Pa. makes THERMOCOMP® and VERTON® thermoplastic materials which can include long carbon fibers. Further, PPG of Pittsburgh, Pa., Corning, N.Y., and Vetrotex of Valley Forge, Pa., are makers of electrical and structural fiberglass products.

FIG. 2 is a top view showing the superior side 37 of the article of footwear 22 shown in FIG. 1. Shown are the tip 25, vamp 52, insole 55, anterior side 33, posterior side 34, medial side 35, and lateral side 36 of the upper 23 of the article of footwear 22. Also shown is the forefoot area 58,

midfoot area 67, rearfoot area 68, and position approximately corresponding to the weight bearing center of the heel 57.

FIG. 3 is a bottom view showing the inferior side 38 of the article of footwear 22 shown in FIG. 1. Shown is an outsole 43 having a tread or ground engaging surface 53 consisting of anterior outsole element 44 that includes lines of flexion 54, and a posterior outsole element 46 that extends substantially within the midfoot area 67 and rearfoot area 68. Alternately, posterior outsole element 46 can be made in two portions, that is, a posterior outsole element 46 positioned adjacent the posterior side 34 in the rearfoot area 68, and a stabilizer 63 or middle outsole element 45 having a generally triangular shape positioned substantially in the midfoot area 67. For the sake of brevity, both options have been shown simultaneously in FIG. 3. It can be readily understood that stabilizer 63 or middle outsole element 45 can be made in various configurations, and various different stiffness in compression options can be made in order to optimize desired performance characteristics such as cushioning and stability for an individual wearer, or a target population of wearers. In this regard, a stabilizer 63 or middle outsole element 45 can include a foam material, gas filled bladders, viscous fluids, gels, textiles, thermoplastic materials, and the like.

FIG. 4 is a longitudinal cross-sectional medial side view of the article of footwear 22 shown in FIG. 1, with parts broken away. Shown in FIG. 4 is a two part outsole 43 consisting of anterior outsole element 44, and posterior outsole element 46, each having a backing 30. Also shown are the upper 23, including a tip 25, vamp 52, heel counter 24, fasteners 29, and insole 31. The insole 31 can be made of a foamed or blown neoprene rubber material including a textile cover and having a thickness of approximately 3.75 mm, or a SORBOTHANE®, or PORON® polyurethane foam material including a textile cover. The insole 31 can include a figure cure material for providing a custom fit in accordance with U.S. Pat. No. 5,632,057 granted to the present inventor, and also patent application Ser. No. 10/234,508, entitled "Method of Making Custom Insoles and Point of Purchase Display," both of these documents having been previously incorporated by reference herein. The superior spring element 51 underlies the insole 31 and can be configured to approximate the shape of the insole 31 and last bottom about which the upper 23 can be affixed during the manufacturing process, or alternately, to a soft data storage and retrieval computer software three dimensional model relating to the configuration and pattern of the upper 23 of the article of footwear.

The spring element 51 can consist of a plurality of portions, and preferably three portions, an anterior spring element 48, a posterior spring element 49, and an inferior spring element 50 which can be affixed together in functional relation, e.g., with the use of at least one mechanical fastener 29, and the like. The anterior spring element 48 can underlay a substantial portion of the forefoot area 58 and is preferably affixed to the posterior spring element 49 in the forefoot area 58 or midfoot area 67 posterior of a position in the range between approximately 60-70 percent of the length of the upper 23 of the article of footwear 22 as measured from the posterior side 34, that is, a position posterior of the metatarsal-phalangeal joints of a wearer's foot when the article of footwear 22 is donned. The metatarsal-phalangeal joints are normally located near approximately 70 percent of foot length on the medial side 35 of the foot, and nearer to approximately 60 percent of foot length on the lateral side 36 of the foot. Accordingly the anterior

spring element 48 can underlay the metatarsal-phalangeal joints of the foot and energy can temporally be stored and later released to generate propulsive force when the anterior spring element 48 undergoes bending during the stance and propulsive phases of the running cycle. The anterior spring element 48 can be selectively and removably attached and renewed in the event of damage or failure. Further, a wearer can select from anterior spring elements 48 having different configurations and stiffness, and therefore customize the desired stiffness of the anterior spring element 48 in an article of footwear 22. For example, different individuals having different body weight, running styles, or characteristic running speeds could desire anterior spring elements 48 having different stiffness.

Likewise, the superior spring element 47 or posterior spring element 46 can be selectively and removably affixed to the inferior spring element 50 in the rearfoot area 68 or midfoot area 67 of the article of footwear 22. Accordingly the superior spring element 47 or posterior spring element 46 can underlay a substantial portion of the wearer's rearfoot and perhaps a portion of the wearer's midfoot and energy can be stored during the braking and early stance phases of the running cycle and released during the later portion of the stance and propulsive phases of the running cycle to provide propulsive force. The anteriormost portion of wearer's rearfoot on the lateral side of the foot is consistent with the junction between the calcaneus and cuboid bones of the foot which is generally in the range between 25-35 percent of a given foot length and that of a corresponding size upper 23 of an article of footwear 22. The superior spring element 47 or posterior spring element 49, and inferior spring element 50 can be selectively and removably attached and renewed in the event of failure. Further, a wearer can select from superior spring elements 47 or posterior spring elements 49, and inferior spring elements 50 having different configurations and stiffness, and therefore customize the desired stiffness of these spring elements in an article of footwear 22. For example, different individuals having different weight, running styles, or characteristic running speeds could desire to select superior spring elements 47 or posterior spring elements 49, and inferior spring elements 50 having different stiffness.

Accordingly, the spring element 51 of a preferred article of footwear can consist of three portions, an anterior spring element 48 which is positioned anterior of at least approximately 70 percent of the length of the upper 23 of the article of footwear 22 as measured from the posterior side 34, a posterior spring element 49 which extends anteriorly from proximate the posterior side 34 of the upper 23 of the article of footwear 22 and is affixed in functional relation to the anterior spring element 48, and an inferior spring element 50 which is affixed in functional relation to the posterior spring element 49. The inferior spring element 50 projects rearwards and downwards and can extend beneath a substantial portion of the rearfoot area 68 of the article of footwear 22. Alternately, the spring element 51 can be formed in two portions or a single part.

In the embodiment shown in FIG. 4, the elevation of the wearer's foot in the rearfoot area 68 measured under the weight bearing center of a wearer's heel 57 is approximately 26 mm, and the elevation of the wearer's foot in the forefoot area 58 measured under the ball of the foot proximate the metatarsal-phalangeal joints is approximately 16 mm in a size 9 men's article of footwear. The difference in elevation between the forefoot area 58 measured under the ball of the foot and the rearfoot area 68 measured under the weight bearing center of a wearer's heel 57 in a men's size 9 article

of footwear is commonly in the range between 10–12 mm, and is approximately 10 mm in the embodiment shown in FIG. 4.

For some footwear applications, such as competition in track and field or road racing, the maximum amount of deflection that might be desired by some individuals between the superior spring element 47 or posterior spring element 49 and the inferior spring element 50 could be in the range between 8–15 mm. As shown in FIG. 4, the maximum amount of deflection possible as between posterior spring element 49 and inferior spring element 50 is approximately 10 mm. However, greater amounts of deflection in the range between 15–50 mm can be desired for use by some individuals in various footwear applications, as shown and discussed herein with respect to other embodiments of the present invention. Nevertheless, it can be advantageous from the standpoint of injury prevention that the elevation of the rearfoot area 68 minus the maximum amount of deflection permitted between the superior spring element 47 or posterior spring element 49 and the inferior spring element 50 be equal to or greater than the elevation of the forefoot area 58. It can also be advantageous as concerns the longevity of the working life of the spring element 51 that the amount of deflection permitted be equal to or less than approximately 75 percent the maximum distance between the proximate opposing sides of the spring element 51, that is, as between the inferior surface of the superior spring element 47 or posterior spring element 49 and the superior surface of the inferior spring element 50.

The amount of deflection or compression provided under the wearer's foot in the forefoot area 58 by the embodiment shown in FIG. 4 is commonly approximately in the range between 4–6 mm, and such can be provided by an insole 31 having a thickness of 3.75 mm in combination with an anterior outsole element 44 having a total thickness of 6.5 mm including a backing 30 having a thickness of approximately 1.5 mm and a tread or ground engaging portion 53 having a thickness of approximately 5 mm, and in particular, when the ground engaging portion 53 is made of a relatively soft and resilient material having good traction, and shock and vibration dampening characteristics. For example, a foamed natural or synthetic rubber or other elastomeric material can be suitable for use. If hypothetically, an outsole material having advantageous traction, and shock and vibration dampening characteristics only lasts 200 miles during use, that is, as opposed to perhaps 300 miles associated with a harder and longer wearing outsole material, this does not pose a practical problem, as the outsole 43 portions can be easily renewed in the present invention, whereas a conventional article of footwear would normally be discarded. Accordingly, it is possible to obtain better traction, and shock and vibration dampening characteristics in the present invention as the durability of the outsole 43 portions is not such an important criteria.

FIG. 5 is a longitudinal cross-sectional lateral side view of the article of footwear 22 shown in FIG. 1, with parts broken away. Shown in dashed lines is the medial aspect of the inferior spring element 50. It can be advantageous that the flexural axis 59 be deviated from the transverse axis 91 in the range between 10–50 degrees in an article of footwear intended for use in walking or running. As shown in FIGS. 4 and 5, the flexural axis 59 is deviated at about 35 degrees from the transverse axis 91 of the article of footwear 22.

It can be readily understood that posterior of the flexural axis 59 the length of the superior lever arm 60 and inferior lever arm 61 formed along the medial side 35 of the superior spring element 47 or posterior spring element 49 and the

inferior spring element 50 are shorter than the length of the corresponding superior lever arm 60.1 and inferior lever arm 61.1 formed along the lateral side 36 of the superior spring element 47 or posterior spring element 49 and the inferior spring element 50. Accordingly, when the inferior spring element 50 is affixed in functional relation to the superior spring element 47 or posterior spring element 49 and is subject to compressive loading, the inferior spring element 50 exhibits less stiffness in compression at the lateral and posterior corner, and increasing stiffness in compression both anteriorly and laterally. Again, it can be advantageous for enhancing rearfoot stability during walking or running that the spring element 51 including inferior spring element 50 exhibit approximately two to three times the stiffness in compression on the medial side 35 relative to the stiffness exhibited on the lateral side 36. Further, as shown in FIGS. 4 and 5, the inferior aspect of the spring element 51 has a concave configuration in the midfoot area 67, that is, between the inferiormost portion of the anterior spring element 48 in the forefoot area 58 and the inferiormost portion of the inferior spring element 50 in the rearfoot area 68. It can be readily understood that the configuration of this concavity 76 and the flexural modulus of the spring element 51, as well as the stiffness of the anterior outsole element 44, middle outsole element 45, posterior outsole element 46, anterior spacer 55, and posterior spacer 42 can be engineered to provide optimal cushioning characteristics such as deflection with respect to the midfoot area 67 and rearfoot area 68 for an individual wearer, or for a target population having similar needs and requirements.

FIG. 6 is a top view of a spring element 51 in the article of footwear 22 similar to that shown in FIG. 2, but having a relatively more curved shape corresponding to a relatively more curve lasted upper 23 shown in dashed lines. Shown is a spring element 51 consisting of a single full length superior spring element 47.

FIG. 7 is a top view of a two part spring element 51 consisting of anterior spring element 48 and posterior spring element 49 in the article of footwear 22 shown in FIG. 2, with the upper 23 shown in dashed lines.

FIG. 8 is a top view of a two part spring element 51 consisting of anterior spring element 48 and posterior spring element 49 in an article of footwear 22 generally similar to that shown in FIG. 2, but having a relatively more curved shape corresponding to a relatively more curve lasted upper 23 which is shown in dashed lines. The anterior spring element 48 and posterior spring element 49 can be affixed with three fasteners 29 in triangulation. The posterior spring element 48 can include a projection 70 proximate the longitudinal axis 69 of the article of footwear 22. The configuration of this projection 70 can at least partially determine the torsional rigidity of the assembled spring element 51 consisting of anterior spring element 48 and posterior spring element 49, thus the degree to which the forefoot area 58 can be rotated inwards or outwards about the longitudinal axis 69. Further, the number, dimension, and location of the fasteners 29 used to affix the anterior spring element 48 and posterior spring element 49 can affect both the flexural modulus of the superior spring element 47 along the length of the longitudinal axis 69, but also rotationally about the longitudinal axis 69, that is, the torsional modulus of the superior spring element 47. A portion of the anterior spring element 48 is shown broken away in order to reveal the optional inclusion of an anterior spacer 55 between the anterior spring element 48 and the posterior spring element 49.

As shown in FIG. 8, an anterior spacer 55 which can possibly consist of a cushioning medium or cushioning means having desired spring and dampening characteristics, can be inserted in the area between the anterior spring element 48 and posterior spring element 49, that is, within an area of possible overlap as between the two components. The configuration and compressive, flexural, and torsional stiffness of an anterior spacer 55 can be used to modify the overall configuration and performance of a spring element 51 and article of footwear 22. In this regard, an anterior spacer 55 can have uniform height, or alternately an anterior spacer 55 can have varied height. Further, an anterior spacer 55 can exhibit uniform compressive, flexural, and torsional stiffness throughout, or alternately an anterior spacer 55 can exhibit different compressive, flexural, and torsional stiffness in different locations. These varied characteristics of an anterior spacer 55 can be used to enhance the cushioning, stability and overall performance of an article of footwear 22 for a unique individual wearer, or for a target population of wearers. For example, an anterior spacer 55 having an inclined or wedge shape can be used to decrease the rate and magnitude of pronation, supination, and inward or outward rotation of portions of a wearer's foot during portions of the walking or running gait cycle, and can also possibly correct for anatomical conditions such as varus or valgus. The relevant methods and techniques for making corrections of this kind are relatively well known to qualified medical doctors, podiatrists, and physical therapists. See also U.S. Pat. No. 4,399,620, U.S. Pat. No. 4,578,882, U.S. Pat. No. 4,620,376, U.S. Pat. No. 4,642,911, U.S. Pat. No. 4,949,476, and U.S. Pat. No. 5,921,004, all of these patents hereby being incorporated by reference herein. Normally, an anterior spacer 55 having an inclined wedge shape that increases in height from the lateral to the medial side, or one which exhibits greater stiffness in compression on the medial side can be used to compensate for a forefoot varus condition, whereas an anterior spacer 55 having an inclined wedge shape that increases in height from the medial to the lateral side, or one which exhibits greater stiffness in compression on the lateral side can be used to compensate for a forefoot valgus condition. An individual with a profound anatomical condition such as varus or valgus, or having a history of injury would be prudent to consult with a trained medical doctor when contemplating modification to their articles of footwear. Further, an anterior spacer 55 can also have a wedge or complex curved shape along the longitudinal axis 69, that is, in the posterior to anterior orientation, and various configurations of an anterior spacer 55 can be provided which can be used to modify the amount of toe spring 62 and the overall conformance of a spring element 51 and article of footwear 22, as desired.

FIG. 9 is a bottom view of the article of footwear 22 shown in FIG. 3, with the anterior outsole element 44 and posterior outsole element 46 removed to reveal the anterior spring element 48, posterior spring element 49, and inferior spring element 50. The flexural axis 59 of inferior spring element 50 is deviated approximately 35 degrees from the transverse axis 91. This configuration can be advantageous for use by distance runners who otherwise tend to pronate significantly during the braking and stance phases of the running cycle. Further, a portion of the inferior spring element 50 is shown broken away to reveal the optional use of a posterior spacer 42 which can serve a role in functional relation to the inferior spring element 50 and the superior spring element 47 or posterior spring element 49 analogous to that of the anterior spacer 55 which can be used as between the anterior spring element 48 and posterior spring

element 49. Further, a posterior spacer 42 can also have a wedge or complex curved shape along the longitudinal axis 69, that is, in the posterior to anterior orientation, and various configurations of a posterior spacer 42 can be provided which can be used to modify the overall conformance of a spring element 51 and article of footwear 22, as desired.

It can be readily understood that in this specification and the associated drawing figures, the orientation and location of the longitudinal axis 69 is determined by longitudinally bisecting the rearfoot area 68 of the article of footwear 22, and likewise, any related components that are present in the rearfoot area 68 such as the inferior spring element 50, and also the posterior portion of the superior spring element 47 or posterior spring element 49. It is recognized that a long longitudinal axis 69 drawn in this manner will not bisect the forefoot area 58 of an article of footwear 22 having a substantially curve lasted configuration. The orientation of the transverse axis 91 can be determined by drawing a line perpendicular to the longitudinal axis 69 as defined above, that is, the transverse axis 91 intersects the longitudinal axis 69 at a 90 degree angle. Accordingly, when an article of footwear 22 or component such as an inferior spring element 50 is recited as including or having a longitudinal axis 69 or transverse axis 91, it can be readily understood that this refers to the aforementioned defined coordinate system for describing, e.g., the orientation, relationship, or various specific features of the sub-components which are part of an article of footwear made according to the present invention.

FIG. 10 is a bottom view of an alternate article of footwear 22 with the anterior outsole element 44 and posterior outsole element 46 removed to reveal anterior spring element 48, posterior spring element 49 and an alternate configuration of inferior spring element 50. The flexural axis 59 of inferior spring element 50 is deviated approximately 30 degrees from the transverse axis 91. The anterior spring element 48, posterior spring element 49, and inferior spring element 50 are shown affixed together in an overlapping relationship in FIGS. 9 and 10. However, it can be readily understood that various components of a spring element 51 can be affixed in function relation with the use of adhesives, mating male and female parts such as tongue and groove, or other configurations and devices known in the prior art.

The possible use of notches 71 or openings 72 in order to diminish the stiffness in bending or flexural modulus exhibited by a portion of spring element 51, and two substantially transverse lines of flexion 54 is also shown in FIG. 10. Shown with a dashed line 90 in FIG. 10, and also in medial side view in FIG. 14, is the possible inclusion of a rocker 87 configuration in the forefoot area 58 of the sole 32 of article of footwear 22. It can be advantageous for the point of greatest elevation of the rocker 87 to be located approximately in the range between 1-4 cm posterior of the metatarsal-phalangeal joints. The location of the first metatarsal-phalangeal joint 88 on the medial side 35 of an average wearer's foot is normally at slightly less than seventy percent of foot length, and the location of the fifth metatarsal-phalangeal joint 89 on the lateral side 36 is normally somewhat greater than sixty percent of foot length as measured from the posterior side 34 of the wearer's foot. Accordingly, a rocker 87 can be positioned in the range between 1-4 cm behind a generally transverse and slightly diagonal line that can be drawn as between these two approximate positions for any given size article of footwear.

FIG. 11 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 1, with parts broken away, but having a

forefoot area 58 without substantial toe spring 62. This particular article of footwear 22 can be suitable for use in activities such as tennis, volleyball, or basketball.

FIG. 12 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 11, with parts broken away, having a forefoot area 58 without substantial toe spring 62, but including an anterior outsole element 44, foam midsole 26, and upper 23 which are affixed together with the use of adhesives.

FIG. 13 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 12, with parts broken away, having a forefoot area 58 without substantial toe spring 62, but including a detachable anterior outsole element 44 and foam midsole 26.

FIG. 14 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 similar to that shown in FIG. 4, further including a spring guard 40. The spring guard 40 can be made of a relatively soft resilient material such as a foam material, or a natural or synthetic rubber. The spring guard 40 can prevent foreign matter from becoming lodged in the area proximate the junction of the superior spring element 47 or posterior spring element 49 and the inferior spring element 50, thus can be affixed to the superior spring element 47 or posterior spring element 49, or to the inferior spring element 50, or to both portions of the spring element 51. Alternately, the spring guard 40 can form a portion and extension of posterior spacer 42, as shown in FIG. 18. Further, the spring guard 40 can also serve as a vibration decay time modifier 41, as shown in FIG. 20. Also shown in FIG. 14 is the approximate position of the first metatarsal-phalangeal joint 88 on the medial side 35, and a sole 32 or outsole 43 including a rocker 87 configuration in the forefoot area 58. As shown, the rocker 87 configuration can be formed and substantially consist of a portion of the sole 32 or outsole 43, or alternately, the rocker 87 configuration can be formed at least in part by an inferiorly protruding portion of the spring element 51, and in particular, the anterior spring element 48.

FIG. 15 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 4, with parts broken away, having a upper 23 including a sleeve 39 for accommodating the superior spring element 47. The sleeve 39 can be formed in a portion of the upper 23 inferior to the insole 31, and can possibly consist of a portion of the t-sock 56. The spring element 51 can include an inferior spring element 50, and a superior spring element 47 that can include an anterior spring element 48 and a posterior spring element 49. The superior spring element 47 can be positioned within sleeve 39, thus at least partially retaining the superior spring element 47 in functional relation to the upper 23 of the article of footwear 22.

Further, in contrast with the configuration of inferior spring element 50 shown in FIG. 16, an alternate inferior spring element 50.1 is shown in FIG. 15. The alternate inferior spring element 50.1 descends from proximate the superior spring element 47 or posterior spring element 49 and attains maximum separation therefrom. The inferior spring element 50.1 can then possibly extend posteriorly in a parallel relationship with respect to the overlaying superior spring element 47. However, the inferior spring element 50.1 then curves upwards as the inferior spring element 50.1 extends towards the posterior side 34 of the article of footwear 22. It can sometimes be advantageous that the inferior spring element 50.1 be tapered in the range between approximately 1-15 degrees, or otherwise be curved

upwards, as it extends towards the posterior side 34 and lateral side 36 corner of the sole 32 of the article of footwear 22.

FIG. 16 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 4, with parts broken away. However, this alternate embodiment does not include an additional covering such as a coating, textile, or outsole 43 on the inferior side of the upper 23, as shown in FIG. 4. Accordingly, the inferior side of the upper 23 is in direct contact with the superior side of the backing 30 of the outsole 43, that is, anterior outsole element 44 and posterior outsole element 46 when the article of footwear 22 is assembled. Further, in an alternate embodiment of the present invention, the backing 30 of an outsole 43 can be made of a material having sufficient flexural modulus and resilience as to simultaneously serve as a spring element of the article of footwear, as shown in FIG. 16. Accordingly, the anterior spring element can consist of two portions, anterior spring element 48, and anterior spring element 48.1, which also serves as the backing 30 of anterior outsole element 44.

In the article of footwear shown in FIG. 16, when a line is drawn parallel to the ground support surface and tangent to the inferior surface of the superior spring element 47 in the forefoot area 58, the approximate slope of the superior spring element 47 as it extends posteriorly is approximately five degrees. When affixed in functional relation to the superior spring element 47 or posterior spring element 49, the inferior spring element 50 projects downwards and rearwards therefrom before attaining the desired amount of separation between the components which at least partially determines the maximum amount of deflection that the resulting spring element 51 can provide. As shown in FIG. 16 and several other drawing figures, once the inferior spring element 50 descends and attains the desired amount of separation, the inferior spring element 50 extends posteriorly in a substantially parallel relationship with respect to the corresponding overlaying portion of the superior spring element 47 or posterior spring element 49. Accordingly, after descending from proximate the superior spring element 47 or posterior spring element 49 and establishing the desired amount of separation, the inferior spring element 50 does not curve upwards as it extends towards the posterior side 34 of the article of footwear 22. Instead, it is known in prior art articles of footwear, and can also be advantageous in the present invention for a portion of the outsole 43 near the posterior side 34, and in particular, proximate the posterior side 34 and lateral side 36 corner, to be tapered in the range between 1-15 degrees, or otherwise curved upwards.

However, the overall configuration of the article of footwear 22 including the amount of toe spring 62 and the aforementioned slope of the superior spring element 47 can influence or determine the amount of slope or curvature that is advantageous to incorporate in this portion of the outsole 43. FIG. 17 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 4, having a upper 23 affixed to superior spring element 47, with parts broken away. The upper 23 is affixed to the top or superior surface of superior spring element 47, thus the superior spring element 47 can be exposed on its bottom or inferior surface. Accordingly, the superior surface of the outsole 43 portions including backing 30 can be placed in direct contact with the superior spring element 47 when they are affixed into position.

FIG. 18 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 similar to that shown in FIG. 17, further including a posterior spacer 42. As shown

in FIG. 18, a posterior spacer 42 can include a spring guard 40. As shown in FIG. 20, a spring guard 40 can further include a vibration decay time modifier 41. The posterior spacer 42 can serve to at least partially isolate the superior spring element 47, upper 23 and wearer from the transmission of shock and vibration which could be imparted by the inferior spring element 50 and posterior outside element 46 caused by an impact event.

It can be readily understood that a posterior spacer 42 can serve a purpose analogous to that of anterior spacer 55, and vice-versa. Accordingly, a posterior spacer 42 can consist of a cushioning medium or cushioning means having desired spring and dampening characteristics. The posterior spacer 42 can be inserted between the inferior spring element 50 and posterior spring element 49, that is, within an area of possible overlap as between the two components. The configuration and stiffness of a posterior spacer 42 can be used to modify the overall configuration and performance of a spring element 51 and article of footwear 22. In this regard, a posterior spacer 42 can have uniform height, or alternately a posterior spacer 42 can have varied height. Further, a posterior spacer 42 can exhibit uniform compressive, flexural, or torsional stiffness throughout, or alternately can exhibit different properties in different locations. These varied characteristics of a posterior spacer 42 can be used to enhance the cushioning and/or stability of an article of footwear 22 for an unique individual wearer, or for a target population of wearers.

For example, a posterior spacer 42 having an inclined or wedge shape can be used to decrease the rate and magnitude of pronation, supination, inward or outward rotation of portions of a wearer's foot during phases of the walking or running gait cycle, and can also possibly correct for anatomical conditions such as varus or valgus. Again, the relevant methods and techniques for making corrections of this kind are relatively well known to qualified medical doctors, podiatrists, and physical therapists. Normally, a posterior spacer 42 having an inclined wedge shape that increases in height from the lateral to the medial side, or a posterior spacer 42 which exhibits greater stiffness in compression on the medial side can be used to reduce the magnitude and rate of rearfoot pronation, whereas a posterior spacer 42 having an inclined wedge shape that increases in height from the medial to the lateral side, or a posterior spacer 42 which exhibits greater stiffness in compression on the lateral side can be used to reduce the magnitude and rate of rearfoot supination. An individual having a profound anatomical condition such as varus or valgus, an individual who dramatically pronates or supinates, or an individual who has a history of injury would be prudent to consult with a trained medical doctor when contemplating modification to their article of footwear.

It can be readily understood that with the use of an anterior spacer 55 positioned between anterior spring element 48 and posterior spring element 49, and a posterior spacer 42 positioned between the superior spring element 47 or posterior spring element 49 and the inferior spring element 50, that the configuration and functional relationship as between the forefoot area 58, midfoot area 67, and rearfoot area 68 of an article of footwear 22 can be adjusted and customized as desired by an individual wearer. Further, the use of an anterior spacer 55 and/or posterior spacer 42 having a select configuration can be used to adjust the amount of support provided by a superior spring element 47 or posterior spring element 49 which can possibly further include contours for mating with the complex curved shapes of a wearer's foot. For example, it is possible to customize

the amount of support that is provided to the medial longitudinal, lateral longitudinal and transverse arches, and to the sides of a wearer's foot.

FIG. 19 is a longitudinal cross-sectional medial side view

- 5 of an alternate article of footwear 22 having a posterior spacer 22 including a spring guard 40, and also a vibration decay time modifier 41 having a stem 64 and a head 65. The vibration decay time modifier 41 can be affixed in function relation to a portion of spring element 51, and in particular, 10 a portion of an inferior spring element 50. The head 65 of the vibration decay time modifier 41 can be dimensioned and configured for vibration substantially free of contact with a spring element 51 in directions which substantially encompass a 360 degree arc and normal to the longitudinal axis of the stem 64, that is, when the vibration decay time modifier 15 41 is initially excited by shock and vibration. When the superior spring element 47 or posterior spring element 49 and inferior spring element 50 are subjected to compressive loading a vibration decay time modifier 41 can also serve as a stop and prevent any possible impact between these elements. The inclusion of a posterior spacer 42 and/or a vibration decay time modifier 41 can partially attenuate shock and vibration associated with impact events associated with movements such as walking or running, and can 20 25 reduce the vibration decay time following an impact event. This can serve to enhance comfort, proprioception, reduce local trauma, and possibly solicit greater application of force and improved athletic performance.

Generally, the efficiency of a vibration decay time modifier

- 30 will be enhanced the closer it is positioned in functional relation to a negative nodal point. When properly configured and placed proximate the negative nodal point of an object or implement, relatively little mass is required in order to substantially prevent, or alternately, to attenuate resonant vibration within fractions of a second. A negative nodal point is a point at which a substantial portion of the vibration energy in an excited object or implement will pass when it is excited by energy associated with an impact or other vibration producing event. Discussion of modes of vibration 35 and negative nodal points can be found in Arthur H. Benade, *Fundamentals of Musical Acoustics*, 2nd edition, New York: Dover Publications, 1990, Harry F. Olson, *Music, Physics and Engineering*, 2nd edition, New York: Dover Publications, 1967, and U.S. Pat. No. 3,941,380 granted to Francois Rene Lacoste on Mar. 2, 1976, this patent hereby being incorporated by reference herein.

A technology taught by Steven C. Sims in U.S. Pat. No.

- 5,362,046, granted Nov. 4, 1994, this patent hereby being incorporated by reference herein, has been commercialized 40 by Wilson Sporting Goods, Inc. into the SLEDGEHAMMER® INTUNE® tennis rackets, and by Hillerich and Bradsby Company, Inc. in the LOUISVILLE SLUGGER® SIMS STINGSTOP® aluminum baseball and softball bats, as well as the POWERBUILT® SIMS SHOCK RELIEF® golf club line, and LIMBSAVER® product for archery. These products substantially eliminate the vibration and stinging associated with impact events experienced by a wielder's hands. Certain aspects of the aforementioned teachings can be applied in the present invention in order to accomplish a similar results with regards to an article of 45 footwear 22 and the lower extremities of a wearer.

The source of shock and vibration can derive from a relatively controlled and harmonic movement, such as when a wearer repeatedly impacts the pavement while running in an article of footwear 22. Further, the source of shock and vibration can be random in nature, as when a wearer rides a

- 65 wheeled vehicle such as a bicycle or motorcycle over rough

terrain. Alternately, the source of shock and vibration can be constant and mechanically driven as when a wearer rides a bicycle, or a motor vehicle such as a motorcycle or snowmobile. A shock wave, that is, a shock pulse or discontinuity can travel at the speed of sound in a given medium. In the human body, the speed of sound in bone is approximately 3,200 meters/second, and in soft tissue approximately 1,600 meters/second. A shock wave traveling in a relatively dense fluid medium such as water has approximately five times the power that it does in a less dense fluid medium such as air. It is important to recognize that the human body is largely comprised of water and like fluid medium.

When a metal bell is struck, the bell will resonate and continue to ring for an extended time while the vibration energy is gradually damped out. When a small bell is rung, one can place one's hand upon it and silence it. In that case, the primary dampening means for attenuating the resulting shock and vibration is the anatomy of the human subject. The same thing can happen when an impact event takes place as between an individual's foot and the materials which are used in an athletic shoe, and a running surface. When an individual runs on an asphalt surface in running shoes, the sound of the impact event that one hears is the audible portion of the shock wave that has been generated as result of the impact.

Many individuals know from experience that a vibrating implement or object can numb the hands. This is even more true when the source of the vibration is continuous and driven as when power equipment is being used. Associated with that numbness can be pain, reduced sensation and proprioception, and reduced muscular effort and performance as the body responds to protect itself from a perceived source of trauma and injury. Chronic exposure to high levels of vibration can result in a medical condition known as white finger disease. Generally, the lower extremities of most individuals are not subject to high levels of driven vibration. However, bicycle riders wearing relatively rigid articles of footwear can experience constant driven vibration, thus their feet can become numb or "go to sleep" over time. Motorcycle riders can also experience the same phenomenon.

The preferred article of footwear includes spring and dampening means for at least partially attenuating shock and vibration, that is, the initial shock pulse, pressure wave, or discontinuity and associated peak g's that are imparted to a wearer due to an impact event. At a cellular or molecular level, such vibration energy is believed to disturb normal functions such as blood flow in tendon tissue. Given appropriate engineering with respect to the characteristic or desired spring stiffness, mass, deflection, frequency, dampening, and percent transmissibility, an article of footwear of the present invention can partially attenuate shock and vibration. Viscous, friction, and mechanical dampening means can be used to attain this end. It is known that the mean power frequency associated with the rearfoot impact event in running generally corresponds to 20 Herz, and that of the forefoot to 5 Herz. The design and configuration, as well as the spring and dampening characteristics of a spring element 51, posterior spacer 42, and vibration decay time modifier 41 can be engineered so as to target these frequencies and provide a specific characteristic tuned mechanical response.

An anterior spacer 55, posterior spacer 42, and vibration decay time modifier 41 can be made of a cushioning medium or cushioning means such as a natural or synthetic rubber material, or a resilient elastomer such as polyurethane. In this regard, thermoset or thermoplastic materials can be

used. Thermoplastic materials can be less expensive to produce as they can be readily injection molded. In contrast, thermoset materials are often compression molded using a relatively time and energy consuming vulcanization process. However, some thermoset materials can possess superior dampening properties and durability. Dampening materials which can be cured with the use of ultrasonic energy, microwave, visible or ultraviolet light, radio frequency, or other portions of the electromagnetic spectrum can be used. Room temperature cure elastomers, such as moisture or evaporation cure, or catalytic cure resilient materials can also be used. A suitable dampening material can be made of a butyl, chloroprene, polynorbornene, neoprene, or silicone rubber, and the like. Alternately, a dampening material can be made of an elastomeric material such as polyurethane, or SORBOTHANE®. Suitable hybrid thermoplastic and rubber combinations can also be used, including dynamically vulcanized alloys which can be injection molded such as those produced by Advanced Elastomer Systems, 338 Main Street, Akron, Ohio 44311, e.g., SANTOPRENE®, VYRAM®, GEOLAST®, and TREFSIN®. SANTOPRENE® is known to consist of a combination of butyl rubber and ethylene-propylene. Generally, other materials developed for use in the audio industry for dampening vibration such as EAR ISODAMP®, SINATRA®, EYDEX®, and the like, or combinations thereof, can be used. Fillers such as organic or inorganic microspheres, carbon black or other conventional fillers can be used. Plasticizing agents such as fluids or oils can be used to modify the physical and mechanical properties of the dampening material in a desired manner. The preferred dampening material has transition characteristics suitable for the expected operational temperature of an article of footwear 22, and other physical and mechanical properties well suited to dampen shock and vibration and reduce vibration decay time.

It can be advantageous that the dampening material used to make a solitary vibration decay time modifier 41 including a stem 64 and a head 65 have a hardness in the range of 40-50 durometer, and preferably approximately 20 durometer on the Shore A scale. A relatively soft dampening material is capable a dampening a wide range of exciting vibration frequencies, and also relatively low vibration frequencies. However, a harder dampening material having greater shear and tear strength can sometimes be advantageous for use when making an anterior spacer 55 or posterior spacer 42 due to the magnitude of the loads which can be placed upon these components during use. A vibration decay time modifier 41 can be affixed to spring element 51 by conventional means such as adhesive, mechanically mating parts, chemical bonding, heat and pressure welding, radio frequency welding, compression molding, injection molding, photocuring, and the like.

In a conventional article of footwear having a foam midsole and rubber outsole, the materials located between the wearer's foot and the inferior ground engaging surface of the outsole normally become compressed during footstrike and subsequent loading of the sole. During compressive loading the stiffness of these materials increases linearly or geometrically and as a result the ability of the sole to dampen shock and vibration rapidly diminishes. Further, the area of the sole which transmits most of the shock and vibration can be relatively small and localized. In this regard, the energy associated with a shock pulse or discontinuity passes tends to pass quickly by the shortest route and through the hardest and stiffer material in which it is in communication. Again, the transmission of shock and vibration is extremely fast in

the human body and the materials used in conventional articles of footwear. In a conventional article of footwear, the shock and vibration resulting from impact with the support surface is rapidly transmitted through the outsole, midsole, upper and insole and into a wearer's foot.

However, in the present invention the shock and vibration generated proximate the inferior ground engaging surface 53 of the outsole 43 must travel anteriorly along the outsole 43 and inferior spring element 50 before being transmitted to the superior spring element 47, upper 23 and wearer, thus for a greater distance relative to a conventional article of footwear. This affords more time and space in which to attenuate and dampen shock and vibration. Further, in the present invention the outsole 43 can be made of a softer material having better shock and vibration dampening characteristics than is normally the case in a conventional article of footwear. In addition, a posterior spacer 42 can serve as a shock and vibration isolator between the inferior spring element 50 and the superior spring element 47, upper 23, and wearer's foot. Moreover, as shown in FIGS. 19 and 20, at least one vibration decay time modifier 41 can be positioned in direct communication with inferior spring element 50 in order to dampen shock and vibration before it can be transmitted to a wearer. Accordingly, the present invention can provide a wearer with enhanced cushioning, shock and vibration isolation, and dampening effects relative to conventional footwear constructions.

FIG. 20 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 including a posterior spacer 42 similar to that shown in FIG. 18. As shown in FIG. 20, a posterior spacer 42 can include a spring guard 40 and at least one protrusion which can be configured and engineered to serve as a vibration decay time modifier 41.

FIG. 21 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 1, but having various components including the upper 23, spring element 51, and outsole 43 affixed together with the use of adhesives in the manner of a conventional article of footwear.

FIG. 22 is a bottom view of an alternate article of footwear 22 generally similar to that shown in FIG. 3, having a spring element 51 configured for accommodating a detachable bicycle cleat 73. The article of footwear 22 can then serve as bicycling shoe, and possibly also as a functional upper 23 for an in-line skate, as taught in the applicant's co-pending U.S. patent application Ser. No. 09/228,206 entitled "Wheeled Skate With Step-In Binding And Brakes," hereby incorporated by reference herein.

Also shown in FIG. 22 is flexural axis 59, and with the use of a dashed line, an alternate position of flexural axis 59.1 with reference to the longitudinal axis 69. It can be readily understood that other more anterior or more posterior positions of a flexural axis 59 with reference to the longitudinal axis 69 are possible. The position of the flexural axis 59 can be selected in order to influence or determine the physical and mechanical properties of a spring element 51, and the overall conformance and performance of an article of footwear 22, as desired. Generally, it can be advantageous that the posteriomost portion of the flexural axis 59 on the medial side be located in the range between 1-6 inches from the posteriormost portion of the upper, and in particular, in the range between 2-4 inches from the posteriormost portion of the upper. However, in the footwear embodiment shown in FIG. 22, it can be advantageous both with respect to the stability of the preferred article of footwear 22, but also the weight and cost of the spring element, that the posteriomost position of the flexural axis 59 on the medial side 35 be located approxi-

mately in the range between 1-3.5 inches from the posteriormost portion of the upper 23 in a men's size 9 article of footwear 22. The method of grading and scaling various footwear components for other men's or women's sizes is well known in the footwear industry, thus the preferred range as concerns the position of the flexural axis 59 on the medial side 32 can be determined from this information for any given size article of footwear 22.

It can be readily understood that this teaching concerning the angular orientation of the flexural axis 59 with reference to the longitudinal axis 69 can be applied to other embodiments of a preferred article of footwear 22. Possible angular deviation of the flexural axis 59 from the transverse axis 91 in the range between 10-50 degrees was previously discussed. One advantage to using a flexural axis 59 that is deviated from the transverse axis 91 in the range between 10-50 degrees is that it permits the use of an inferior spring element 50 having a relatively homogenous construction and a substantially uniform thickness, and this both serves to reduce manufacturing costs and enhances product reliability. It can be readily understood that various combinations and permutations with respect to the position of the flexural axis 59 with reference to the longitudinal axis 69 and the angular deviation of the flexural axis 59 from the transverse axis 91 can be functional.

FIG. 23 is a medial side view of an alternate article of footwear 22 generally similar to that shown in FIG. 17, but having the anterior outsole element 44, posterior outsole element 46, and inferior spring element 50 removed, and further including track spike elements 66. This embodiment can facilitate enhanced athletic performance and can be used by track and field athletes in the sprinting and jumping events. Further, the spring element 51 can extend upwards about the area of the heel to form an integral heel counter 24, as shown in FIG. 23. In addition, the spring element 51 can extend upwards about the lateral side 36 of the forefoot area 58 to form a side support 74, as shown with dashed lines in FIG. 23. Various configurations of a side support 74 and/or an integral heel counter 24 can be incorporated in any or all embodiments of a preferred article of footwear 22, as desired. Moreover, the superior spring element 47 used in any or all embodiments of a preferred article of footwear 22 can be configured to mate with or otherwise support the complex curved shapes and structures associated with the anatomy of the human foot.

FIG. 24 is a cross sectional view of the anterior spacer 55 included in the article of footwear 22 shown in FIG. 8, taken along line 24-24. As shown in FIG. 24, the anterior spacer 55 has a uniform elevation.

FIG. 25 is a cross sectional view of an alternate anterior spacer 55.1 generally similar to that shown in FIG. 8, but having a wedge shape 28, taken along a line consistent with line 24-24. As shown in FIG. 25, the anterior spacer 55.1 has a wedge shape 28 which slopes upward from the lateral side 36 to the medial side 35.

FIG. 26 is a cross sectional view of the posterior spacer 42 included in the article of footwear 22 shown in FIG. 9, taken along line 26-26. As shown in FIG. 26, the posterior spacer 42 has a uniform elevation.

FIG. 27 is a cross sectional view of an alternate posterior spacer 42.1 generally similar to that shown in FIG. 9, but having a wedge shape, taken along a line consistent with line 26-26. As shown in FIG. 27, the posterior spacer 42.1 has a wedge shape 28 which slopes upward from the lateral side 36 to the medial side 35.

FIGS. 24-27 have been provided to illustrate a few of the possible configurations of an anterior spacer 55 and poste-

rior spacer 22, and other variations are both possible and anticipated. For example, the configuration and slope of the wedge shapes 28 can be the opposite of that represented, and the anterior spacer 55 and/or posterior spacer 22 can slope upwards from the medial side 35 to the lateral side 36. Further, the anterior spacer 55 and/or posterior spacer 22 can have more complex or compound curved shapes. In addition, it can be readily understood that the amount of elevation and/or degree of slope of the anterior spacer 55 and/or posterior spacer 42 can be varied. The compressive, flexural and torsional stiffness of different anterior spacers 55 and/or posterior spacers 22 can also be varied. Moreover, an anterior spacer 55 and/or posterior spacer 22 can be made to exhibit differential stiffness in different portions.

Again, an anterior spacer 55 or posterior spacer 42 can also have a wedge or complex curved shape along the longitudinal axis 69, that is, in the posterior to anterior orientation, and various configurations can be provided which can be used to modify the overall conformance of a spring element 51 and article of footwear 22, as desired. Accordingly, many variables can be manipulated and selected to optimize the configuration and performance of an article of footwear for an individual, or for a given target population having similar characteristics and requirements.

FIG. 28 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 having a different configuration of a spring element 51, with parts broken away. In this embodiment, the anterior spring element 48 and inferior spring element 50 can be affixed in functional relation with the use of mechanical means such as fasteners 29, and the like, or alternately be formed as a single component identified herein as anterior and inferior spring element 75. The anterior portion of the spring element 51 can pass through a slit in the t-sock 56 or upper 23 and then be affixed with fasteners 29 to outsole 43, thereby firmly securing the upper 23 in functional relation thereto. As shown, the posterior spring element 49 can be affixed to the posterior portion of the spring element 51 with at least one fastener 29, and a posterior spacer 42 can also be inserted therebetween. Alternately, the posterior spacer 42 be formed as a coating or otherwise consist of a portion of the t-sock 56 or upper 23. As shown in FIG. 28, the posterior spring element 49 can be made to further include an integral heel counter 24.

FIG. 29 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 including a superior spring element 47, and a selectively removable sole 32 made of a more conventional cushioning medium or cushioning means such as an EVA or polyurethane foam material, a fluid-filled bladder, and a thermoplastic or thermoset rubber outsole. As shown, the sole 32 does not include an inferior spring element 50 made of a fiber composite material or metal. However, the posterior portion of the sole 32 consisting of a conventional cushioning medium or cushioning means such as an EVA or polyurethane foam material, a fluid-filled bladder, and a thermoplastic or thermoset rubber outsole can be made such as to be removable, thus an inferior spring element 50 made of a fiber composite material or metal could alternately be used, as desired. In this patent application, the terms or phrases "cushioning medium" or "cushioning means" shall mean any and all forms of matter, structure, energy, or force capable of attenuating the impact events commonly experienced with the use of articles of footwear. Accordingly, the terms or phrases "cushioning medium" or "cushioning means" can be used to indicate relatively conventional cushioning materials or devices, e.g., an EVA or polyurethane foam material, or

a fluid-filled bladder, but also a spring element 51 solely consisting of a superior spring element 47, or alternately, a spring element 51 including a superior spring element 47 and an inferior spring element 50, and the like.

The superior spring element 47 can have the approximate configuration of the bottom net of a corresponding last 80 or other hard template, model, or pattern. Alternately, the superior spring element 47 can be made in accordance with a soft model created and maintained in a data storage and retrieval computer environment. A superior spring element 47 can possibly simultaneously consist and serve as a lasting board 79, and vice-versa. However, not every structure and material composition of a lasting board 79 would be such as to possibly create or serve as a spring element 51. A lasting board 79 can be made of wood, cellulose, cardboard, or other natural fiber, reconstituted leather, a textile formed by knitting or weaving, a non-woven textile, a textile formed by stitch bonding, metal such as steel, spring steel, aluminum, or titanium, a thermoplastic material such as nylon, polyester, polypropylene, an elastomer such as polyurethane, thermoplastic rubber or other natural or synthetic rubber, or alternately, as preferred and previously discussed in detail, a fiber composite material such as carbon fiber.

The sole 32 can include separate midsole 26 and outsole 43 components, or can be made as a single component. Various sole 32 components can be made having different physical and mechanical characteristics, and performance capabilities for possible selection and use by a wearer. The sole 32 can be selectively removed and replaced by a wearer 30 in order to customize the article of footwear 22, or to renew a component, as desired. As shown in FIG. 29, the spring element 51 does not include an inferior spring element 50, rather the spring element 51 consists of a superior spring element 47, or an anterior spring element 48 and posterior spring element 49 which are affixed in functional relation.

FIG. 30 shows a bottom view of an alternate article of footwear 22 having an anterior lasting board 79 positioned in the forefoot area 58. Also shown is a portion of the inferior side 38 of the upper 23 including a plurality openings 72 which can be made to register with corresponding openings 72 in an anterior lasting board 79, thus enabling the use of a plurality of fasteners 29 to affix the upper 23 in functional relation to the anterior lasting board 79, and a sole 32 which can possibly include a midsole 26 and outsole 43, or merely an outsole 43. The article of footwear 22 shown in FIG. 30 also consists of a slip-lasted construction in the forefoot area 58 including a t-sock 56 to which the upper 23 is affixed by stitching or adhesive, or other conventional means. The t-sock 56 can consist of a substantially non-stretchable textile material, but preferably consists of a stretchable textile material. Alternately, the t-sock 56 can be made of cellulose, paper, cardboard, or other natural fiber, reconstituted leather, a textile formed by knitting or weaving, a non-woven textile, a textile formed by stitch bonding, a thin film or sheet consisting of thermoplastic material such as nylon, polyester, polypropylene, and the like, an elastomer such as polyurethane, thermoplastic rubber or other natural or synthetic rubber. Alternately, the upper 23 can consist of a different type of slip lasted construction, a moccasin construction, a string lasted construction, or another conventional footwear construction known in the art. The article of footwear 22 can include a sole 32 in the midfoot area 67 and rearfoot area 68 which is affixed to the upper 23 in a conventional manner with the use of adhesives. Alternatively, the sole 32 can be affixed to a full length lasting board 79, or a posterior lasting board 79 with the use of fasteners 29.

It can be readily understood that within certain practical limitations, different lasting boards 79 having different configurations possibly including different lengths, foot shapes, and widths can be used with a given upper 23 in order to customize the fit of an article of footwear 22 for a unique individual or target population. For example, a plurality of lasting boards 79 can be developed for use with different target populations consisting of individuals having generally similar anatomical characteristics and foot dimensions. Further, it can also be readily understood that within certain practical limitations, different uppers 23 having different configurations possibly including different lengths, widths, and foot shapes can be used with a given lasting board 79 in order to customize the fit of an article of footwear 22 for a unique individual or target population. For example, a plurality of uppers 23 can be developed for use with different target populations consisting of individuals having generally similar anatomical characteristics and foot dimensions.

FIG. 31 shows a bottom view of the inferior side 38 of the upper 23 of an article of footwear 22 generally similar to that shown in FIG. 30, but including two alternate openings 72 at a plurality of different positions at which a fastener 29 can be used. In the American sizing system, a change in length by one size corresponds to  $\frac{1}{2}$  inch, and changes in width as between respective sizes A, B, C, D, and E are associated with increments of  $\frac{1}{4}$  inch. Further, the increments in length and width associated with other sizing systems are also known. Given an upper 23 having two alternate openings 72 that are separated by  $\frac{1}{4}$  inch for possible use at each different position at which a fastener 29 can be used, and in particular, about the forefoot area 58, it is possible for the article of footwear 22 to provide three possible options such as width sizes B, C, and D. For example, if the openings 72 closest to the lateral side 23 and medial side 22 are associated with an article of footwear 22 having a B width, then increasing the width of the upper 23 by moving the adjacent opening 72 on one side or the other to that position will provide a C width, and moving the other adjacent opening 72 on the opposite side in like manner will provide a D width. It is generally advantageous to configure an upper 23 having only two alternate openings 72 for possible use at each different position at which a fastener 29 can be used in accordance with the width sizing model shown in FIG. 32.

FIG. 32 shows an article of footwear 22 which is adjustable along the entire length of the upper 23 including the forefoot area 58, midfoot area 67, and rearfoot area 68 having two alternate openings 72 for possible use at each different position at which a fastener 29 can be used, and the possible use of local reinforcement material 81 in the area about the openings 72. The reinforcement material 81 can be made of tape, textile, plastic, natural or synthetic rubber, natural or synthetic leather, metal, or other robust material which serves to enhance the strength of the upper 23. The reinforcement material 81 can also be tactified, or otherwise possess relatively high static and dynamic coefficients of friction, and can possibly include a self-adhesive material 83. Nevertheless, it can be advantageous that the self-adhesive material 83 have a repeatable or renewable adhesion and release capability. Also shown is the use of a t-sock 56 made of stretchlastic material that has greater than 100 percent elongation which can easily accommodate the possible  $\frac{1}{2}$  inch width expansion of the upper 23.

FIG. 33 shows a bottom view of the inferior side 38 of the upper 23 of an article of footwear generally similar to that shown in FIGS. 30 and 31, but including three alternate openings 72 for possible use at each different position at which a fastener 29 can be used. In the American sizing

system, a change in length by one size corresponds to  $\frac{1}{2}$  inch, and changes in width as between respective sizes A, B, C, D, and E are associated with increments of  $\frac{1}{4}$  inch. Further, the increments in length and width associated with other sizing systems are also known. Given an upper 23 having three alternate openings 72 that are separated by  $\frac{1}{4}$  inch for possible use at each fastener 29 position, and in particular, about the forefoot area 58, it is possible for the article of footwear 22 to provide five possible width size

options such as width sizes A, B, C, D, and E. For example, if the openings 72 closest to the lateral side 23 and medial side 22 are associated with an article of footwear 22 having a size A width, then increasing the width of the upper 23 by moving the next adjacent opening 72 on one side or the other to that position will provide a B width, and moving the other adjacent opening 72 on the opposite side will provide a C width, and so on, thus possibly also providing size D and E widths, as desired. It can be advantageous to configure an upper 23 having three alternate openings 72 for possible use at each different position at which a fastener 29 can be used in accordance with the width sizing model shown in FIG. 34.

FIG. 34 shows an upper 23 having three alternate openings 72 for possible use at each different position at which a fastener 29 can be used, and also the possible use of reinforcement material 81 in the area about and between the openings 72. This reinforcement material 81 can be made of tape, textile, plastic, natural or synthetic rubber, natural or synthetic leather, metal, or other robust material that will serve to enhance the strength of the upper 23. The reinforcement material 81 can also be tactified, or otherwise possess a relatively high static and dynamic coefficient of friction, and can possibly include a self-adhesive material 83. Nevertheless, it can be advantageous that the self-adhesive material 83 have a repeatable or renewable adhesion and release capability. Also shown is the use of a t-sock 56 made of stretchlastic material that has greater than 100 percent elongation which can easily accommodate the possible 1 inch width expansion of the upper 23.

FIG. 35 shows a lasting board 79 for the forefoot area 58 including a plurality of openings 72, or alternately, a plurality of indications with respect to making a plurality of openings 72 for use in the present invention. These openings 72 can provide alternate positions for use in affixing portions of the upper 23 in functional relation to the lasting board 79 with the use of fasteners 29. Also shown is the use of a code for indicating each different position where a fastener 29 can be used, and also the three alternative openings 72 for possible use at each different position. The same code can also be used with corresponding parts of the upper 23 and sole 32. Accordingly, the information and intelligence created from the raw data which has been collected with respect to an individual wearer or target population can indicate the selection of a specific lasting board 79 and also a specific code indicating the openings 72 to be used in order to provide an individual wearer or target population with an optimal or preferred custom fit. For example, various lasting boards 79 having a particular size length, foot shape configuration, and size width can be given numerical and/or alphabetical identification. Further, the various different positions at which a fastener 29 can be used, and in particular, the alternate openings 72 which are present at each different position can be given an alphabetical and/or numerical identification, as shown in FIG. 35.

Accordingly, the raw data or feedback provided by an individual when transformed into information and intelligence could possibly indicate the selection a lasting board 79 having American length size 11, last or foot shape

number 3 from amongst a possible selection of thirty different last or foot shape configurations, and also indicate selection of the following code with respect to utilization of the various different positions and alternate openings 72: Code 1.1/2.2/3.2/4.2/5.2/6.1/7.2/8.2. In contrast, an different individual could require the same lasting board 79 having American length size 11, last or foot shape number 3, but a different code for optimal utilization of the various different positions and alternate openings 72, e.g., Code 1.2/2.1/3.1/4.2/5.3/6.1/7.2/8.2. Obviously, a different individual could require a lasting board 79 having a different length and also a different last or foot shape, and the data and preferences of different individuals can also indicate or result in the selection of different uppers 23 having different functions, designs, styles, materials, and sizes.

FIG. 36 shows an alternate lasting board 79 or spring element 51 for use in the forefoot area 58 of an article of footwear 22. The spring element 51 consists of a posterior spring element 49 and an anterior spring element 48 which includes a longitudinal slit 82 that at least partially separates the medial side 35 from the lateral side 36 and permits somewhat independent articulation and flexion of these two portions. It can be advantageous for the position of the longitudinal slit 82 to coincide with the space between an wearer's first and second toes and corresponding metatarsals, or alternately, with the space between an wearer's second and third toes and corresponding metatarsals. This can facilitate independent articulation of the toes and metatarsals of the foot and possibly enhance both comfort and athletic performance. See also U.S. Pat. No. 5,384,973 granted to the present inventor and assigned to Nike, Inc., previously incorporated by reference herein. The physical and mechanical properties of the anterior spring element 48 can be varied as between its anterior side and posterior side, but also as between its medial side 35 and lateral side 36.

A lasting board 79 or spring element 51 component having a given size length can also sometimes be used with articles of footwear 22 which are in the range between one to three different half sizes longer and shorter. As shown in FIG. 36, at least one alternate set of openings 72 can be included on the posterior spring element 49 for affixing the posterior spring element 49 in functional relation to the anterior spring element 48. Further, an alternate set of openings 72 can be included on the anterior spring element 48 for the same purpose. In the American sizing system, length changes of one full size approximately correspond to increments of  $\frac{1}{3}$ rd of an inch, and the distances associated with other sizing systems are also known. Accordingly, two sets of alternate openings 72 spaced apart by a distance corresponding to a full size length can sometimes render a lasting board 79 or spring element 51 suitable for use with three or four sizes.

FIG. 37 shows a different alternate lasting board 79 or spring element 51 including an anterior spring element 48 and a posterior spring element 49. The anterior spring element 48 for use in the forefoot area 58 of an article of footwear 22 consists of two separate parts, that is, a medial anterior spring element 78, and lateral anterior spring element 77. This configuration separates the medial side 35 from the lateral side 36 and permits substantial independent articulation and flexion of these two parts. It can be advantageous for the position of the longitudinal opening 72 between the medial anterior spring element 78 and lateral anterior spring element 77 to coincide with the space between an wearer's first and second toes and corresponding metatarsals, or alternately, with the space between an wearer's second and third toes and corresponding metatarsals.

This can facilitate independent articulation of the toes and metatarsals of the foot and possibly enhance both comfort and athletic performance. See U.S. Pat. No. 5,384,973 granted to the present inventor and assigned to Nike, Inc., previously incorporated by reference herein. The physical and mechanical properties of the medial anterior spring element 78 and lateral anterior spring element 77 can be varied as between their respective anterior sides and posterior sides, but also as between their respective medial sides 35 and lateral sides 36. Further, the configuration and also the physical and mechanical properties of the medial anterior spring element 78 and lateral anterior spring element 77 can be different from one another. In addition, different medial anterior spring elements 78 and lateral anterior spring elements 77 can be selected for use in an article of footwear 22. Also shown in FIG. 37 is the possible use of a plurality of different alternate openings 72 for affixing the medial anterior spring element 78 and lateral anterior spring element 77 in different relative positions. Given American footwear sizing, if the medial anterior spring element 78 and lateral anterior spring element 77 are configured to provide a size B width when the two parts are in a closed position, that is, the two parts are adjacent to one another, then moving one of the parts  $\frac{1}{4}$  inch will provide a size C width, and moving the other part  $\frac{1}{4}$  inch will provide a D width, and the two parts will then be separated by  $\frac{1}{2}$  inch. If the medial anterior spring element 78 and lateral anterior spring element 77 are configured to provide a size A width when the two parts are in a closed position, that is, the two parts are adjacent to one another, then moving one of the parts  $\frac{1}{4}$  inch will provide a size B width, and moving the other part  $\frac{1}{4}$  inch will provide a C width, and so on, such that when providing an E width the two parts will be separated by one inch. The position of any potential openings 72 corresponding to half or whole size increments associated with a given sizing system which are to be made in portions of a lasting board 79, spring element 51, upper 23, or sole 32, can be indicated upon any or all of the components, or alternately, the various openings 72 can be made in stock parts intended for future use. Further, it can be readily understood that the openings 72 and any other adjustments which are made to various components of a customized article of footwear 22 can be unique to an individual wearer.

FIG. 38 is a transverse and exploded cross-sectional view taken along line 38—38 in FIG. 16 of an alternate article of footwear 22 showing a lasting board 79 or spring element 51 having male mechanical engagement means affixed thereto, and also an upper 23, insole 31, sole 32, and female mechanical engagement means for engaging in functional relation with the male mechanical engagement means. The male and female mechanical engagement means can consist of fasteners 29 have a male part 85 and a female part 86. Alternately, the male part 85 can be affixed to the sole 32, or the fasteners 29 can consist of loose parts. The fasteners 29 shown on the left in FIG. 38 can be visible on the inferior side 38 of the sole 32. Alternately, a fastener 29 can include a male part 85 or female part 86 which is affixed within the sole 32, and the corresponding mating part can be inserted and affixed in functional relation from the superior side 60 within the defined space of the upper 23 of an article of footwear 22, as shown on the right in FIG. 43. Alternately, as shown on the right in FIG. 38, the fasteners 29 can include a resilient material suitable for use on the sole 32 or outsole 43 such that the fasteners 29 are hardly visible and their use does not appreciably degrade the cushioning or traction provided by the sole 32 or outsole 43. Alternately, a fastener 29 including a resilient material or other material can project

from the surface of the sole and form a traction member, lug, or cleat, as shown in FIG. 23.

FIG. 39 is a transverse cross-sectional view taken at a position consistent with line 38—38 in FIG. 16 of an alternate article of footwear 22 showing an insole 31 overlapping the superior side 38, medial side 35, lateral side 36, and a portion of the inferior side 38 of a lasting board 79 or spring element 51. The insole 31 can include a stock fit recess 84 for receiving the lasting board 79 or spring element 51. The insole 31 can be affixed by adhesive or overmolded to the lasting board 79 or spring element 51. Alternatively, a portion of the insole 31 can be trapped between the inferior side 38 of the lasting board 79 or spring element 51 and the upper 23 when the article of footwear 32 is assembled, as shown in FIG. 39. This configuration can also serve to protect and cushion the edges of the lasting board 79 or spring element 51.

FIG. 40 is a cross-sectional view taken at a position consistent with line 38—38 in FIG. 16 of an alternate article of footwear 22 showing a portion of the sole 32 or outsole 43 overlapping the inferior side 38, medial side 35, lateral side 36, and a portion to the superior side 37 of a lasting board 79 or spring element 51. This configuration serves to cover and protect the sides of the spring element 51. The spring element 51 and outsole 43 can be affixed to the upper 23 using a separate lasting board 79 positioned within the upper 23 and secured with fasteners 29. Alternatively, a backing 30 can be used and take the position of the spring element 51, and the spring element 51 can be used and take the position of the lasting board 79, that is, the spring element 51 can simultaneously serve as the lasting board 79, as previously discussed.

FIG. 41 is a transverse cross-sectional view taken at a position consistent with line 38—38 in FIG. 16 of an alternate article of footwear 22 showing a separate lasting board 79 and a spring element 51, and also an upper 23, insole 31, and outsole 43. In this alternate embodiment of an article of footwear 22, the outsole 43 can cover, be affixed, bonded, or over-molded to the spring element 51. The spring element 51 can be completely covered by the outsole 43 on the inferior side 38, or alternately, portions of the spring element 51 can be visible and exposed.

FIG. 42 is a transverse cross-sectional view taken at a position consistent with line 38—38 in FIG. 16 of an article of footwear 22 showing a sole 32 or outsole 43 that is directly affixed and integral to the upper 23, and also a lasting board 79 or spring element 51, and an insole 31. The upper 23 can be made at least in part of a synthetic textile or leather made of a thermoplastic material, and the sole 32 can be made of the same type of thermoplastic material, or so alternately, a different material which can be bonded to the upper 23. For example, a polyurethane material can be used for this purpose. The sole 32 can be affixed or overmolded onto the upper 23 by direct injection method. The direct injection process can be performed upon a substantially finished upper 23 into which a last 80 has been inserted, or upon an unfinished upper 23 which still has a relatively flat configuration and the upper 23 of the article of footwear 22 can then be completed using a three dimensional stitching process.

FIG. 43 is a transverse cross-sectional view taken along a position consistent with line 38—38 in FIG. 16 of an alternate article of footwear 22 showing a sole 32 directly affixed to an upper 23, an insole 31, and also a lasting board 79 or spring element 51 located within a recess 84. The contours associated with the recess 84 can provide a mechanical interlock between the upper 23, spring element

51, and backing 30 of the sole 32 or outsole 43. As shown in FIG. 43, the lasting board 79 or spring element 51 does not extend to the perimeter of the upper 23 or sole 32, and this can reduce the stiffness exhibited at the perimeter or edge of the sole 32, as discussed in U.S. Pat. No. 5,921,004 granted to the present inventor, and assigned to Nike, Inc., hereby incorporated by reference herein. It can be advantageous in an article of footwear 22 intended for use in running to extend the lasting board 79 or spring element 51 to the perimeter or edge of the sole 32 in those areas which are shown in dark shading in FIG. 24 of U.S. Pat. No. 5,921,004, but not to the perimeter or edge of the sole 32 in those areas which are not shaded. Accordingly, in the transverse cross-sectional view shown in FIG. 43, it can be advantageous to extend the lasting board 79 or spring element 51 to the perimeter or edge of the sole 32 on the medial side 35, but not on the lateral side 36. The sole 32 can be removably affixed to the upper 23 with the use of fasteners 29, and the like. As shown on the right in FIG. 43, a fastener 29 can include a male part 85 or female part 86 which is affixed within the sole 32, and the corresponding mating part can be inserted and affixed in functional relation from the superior side within the defined space of the upper 23 of an article of footwear 22. Alternately, the sole 32 can be permanently affixed to the upper 23 with the use of adhesives, or overmolded by direct injection process.

FIG. 44 is a medial side view of an article of footwear 22 comprising a sandal which includes a spring element 51. Again, a spring element 51 can include an anterior spring element 48, a posterior spring element 49, and an inferior spring element 50 affixed together in functional relation. It can be readily understood that a plurality of different designs and configurations are possible with respect to the upper 23 of a preferred sandal. A sandal according to the present invention can be designed for high fashion, or alternately, for hiking and recreational use, as shown in FIG. 44. Further, the various components of a sandal can be affixed together with adhesive, or alternately, can be selectively and removably replaced with the use of mechanical engagement means including but not limited to fasteners 29, and the like.

The present invention teaches and makes possible not only a novel method of manufacturing articles of footwear, but also, a novel way of doing both retail and Internet business. The configuration and dimensions of a given wearer's foot and any other special needs and requirements or wearer preferences can be recorded by direct observation and measurement in a retail or medical setting, or by a wearer or other individual at their home or other remote site, and this data can be used to generate information and intelligence relating to the manufacture of an appropriate custom article of footwear for the wearer and intended end use. This information and intelligence relating to an individual wearer or target population can include a so-called soft virtual model that is created and maintained in computer software or other data storage and retrieval system for present and future use.

Conventional measuring or reproduction means including but not limited to rulers, measuring tapes, Brannock devices, two or three dimensional scanners, pressure sensors, infrared thermography, stereolithography, paper, photographs, photocopies, cameras, images, tracings, video, verbal communication, telephone, television, FAX, computers and computer screens, software, data storage and retrieval systems, e-mail, lasts, lasting boards, templates, molds, models, and patterns can be used, as well as other tangible mediums of expression, and the like. Some of the data which might be collected could include, but not be limited to an individual's:

foot length; foot width at one or more locations; foot girth at one or more locations; arch characteristics such as high arch, normal arch, or low arch; the presence of a varus or valgus condition; bunions; Morton's toe; two dimensional foot shape; three dimensional foot shape; data collected using F-scan equipment and software made by Tekscan, Inc. of Boston, Mass.; strike index, plantar pressure, and center of pressure data collected using Pedar or Fimed equipment made by Novel Electronics, Inc. of St. Paul, Minn.; digital photographs or video images showing superior, inferior, anterior, medial, lateral, and perspective views of an individual's foot; video data collected of an individual while in motion using digital cameras; biomechanical analysis of an individual's motion such as rearfoot motion analysis, and possibly including top, bottom, side, frontal, rear, and perspective view using equipment and software made by manufacturers such as Mikromak GmbH, of Erlangen, Germany, Northern Digital of Waterloo, Ontario, Canada, Motion Analysis of Santa Rosa, Calif., VICON Motion Systems of Lake Forest, Calif., or Peak Performance Technologies, Inc., of Englewood, Colo.; and, the individuals name; mailing and e-mail address; password, phone number; sex; weight; age; training age; walking or running pace; fit preference such as loose, normal, or tight; activity preference; affiliation; sizing system preference such as inches or metric; place of payment such as zip code or city; method of payment such as cash, check, debit card, credit card, and including the relevant account number and expiration date.

Given this collected raw data, information and intelligence can then be created including an individual record which could include a virtual model of an individual's feet. This information and intelligence can be used to select one or more options with respect to a footwear last, or other footwear configuration including length size, width, and girth measurements. Accordingly, this information and intelligence can be used to identify specific categories and footwear models for consideration. If and when working in a computer environment, the various options can be displayed for consideration and selection. Further, an individual can then click on various categories or models in order to receive additional technical information and also pricing information. In addition, an individual can then click on various segments or components of a virtual model or article of footwear being presented, and so access more specific menus relating to selections which can be made according to their preference with respect to the structure, function, material, color and design of a given component. Accordingly, an individual can make a final and confirmed selection.

Given the collected data, the information and intelligence created, and a ready and adequate stock of the various components anticipated for use in making articles of footwear, an individual consumer, or alternately, a worker in a retail, medical, manufacturing, or distribution center which possibly includes an automated system including robotics can gather the required components for assembly. An individual can then purchase the required components and assemble the article of footwear themselves. Alternately, the article of footwear can be manufactured or assembled by a worker in a retail, medical, manufacturing, or distribution center. In any case, a custom article of footwear can be manufactured and assembled within thirty minutes, and in some cases even in less than one minute.

For example, selections can be made from a ready stock of different uppers 23, lasting boards 79, spring elements 51 and related sub-component parts, insoles 31, and sole 32 components possibly including midsoles 26, and outsoles

43, having different configurations and dimensions corresponding to a selected article of footwear 22, and the resulting custom article of footwear 22 can be rapidly made or assembled, as desired. If desired, a substantial portion of an article of footwear 22, that is, greater than fifty percent, and preferably greater than seventy-five percent, and most preferably substantially all of the other major components of the article of footwear can be removably assembled and secured in functional relation to the upper 23 to make a custom article of footwear 22 within minutes. Again, this task can be performed by the consumer, or a service provider at the point of purchase in a retail setting or medical facility. Accordingly, similar to the rapid delivery eyewear retail stores and service centers that presently exist, a consumer can now also be provided with a custom article of footwear within minutes.

In brief, as illustrated in the flow chart shown in FIG. 250, a method of making a custom article of footwear according to the present invention can include the following steps, or their equivalent:

- 20 a) Collecting data relating to a wearer's preferences and the anatomical features and measurements of the wearer's foot;
  - 21 b) Creating information and intelligence for selecting and making an article of footwear for the wearer including creating a virtual model and providing the wearer with options; and,
  - 22 c) Selecting specific options and creating an article of footwear; and,
  - 23 d) Providing the custom article of footwear to the wearer.
- In particular, as illustrated in the flow chart shown in FIG. 251, a method of making a custom article of footwear according to the present invention can include the following steps, or their equivalent:
- 35 a) Collecting data relating to a wearer's preferences and the anatomical features and measurements of the wearer's foot;
  - 36 b) Creating from the collected data information and intelligence for making the article of footwear for the wearer;
  - 37 c) Providing the information and intelligence to a physical location at which the article of footwear can be made;
  - 38 d) Selecting a foot length size;
  - 39 e) Selecting a three dimensional foot shape including width and girth dimensions;
  - 40 f) Selecting a plurality of footwear components including an upper including closure means, an insole, a spring element, at least one mechanical fastener, and a sole which can be selectively removed and replaced using mechanical engagement means including the at least one mechanical fastener; and,
  - 41 g) Removably securing the plurality of footwear components including the upper including closure means, the insole, the spring element, the at least one mechanical fastener, and the sole in functional relation with the mechanical engagement means including the at least one mechanical fastener, and completing the assembly and making of the article of footwear.

Alternately, if and when an individual's data and final selection is received from a remote site at the Website of a footwear company which practices the present invention, and this information is then possibly transmitted electronically to a manufacturing, assembly center, or distribution center, the selected and required components for the customized article of footwear, or a fully assembled article of footwear can be made available or delivered to a consumer at their home or other designated address within a selected

number of working days, e.g., by mail, will call, courier, FEDEX, UPS, or other like means of delivery. Within the continental United States, and many other host countries in which the present invention would be practiced, a customized article of footwear could be caused to be delivered by same day or overnight service, as desired. Accordingly, the present invention teaches a novel method of manufacturing articles of footwear, and also, a novel way of doing both retail and Internet business.

In brief, as illustrated in the flow chart shown in FIG. 252, a method of conducting business, including making and selling a custom article of footwear according to the present invention can include the following steps, or their equivalent:

a) Collecting data relating to a wearer's preferences and the anatomical features and measurements of the wearer's foot;

b) Creating information and intelligence for selecting and making an article of footwear for the wearer including creating a virtual model and providing the wearer with options;

c) Selecting specific options and creating the article of footwear; and,

d) Providing the custom article of footwear to the wearer.

In particular, as illustrated in the flow chart shown in FIG. 253, a method of conducting business including making and selling a custom article of footwear according to the present invention can include the following steps, or their equivalent:

a) Collecting data relating to a wearer's preferences and the anatomical features and measurements of the wearer's foot;

b) Creating information and intelligence for making the article of footwear for the individual;

c) Providing the information and intelligence to a physical location at which the article of footwear can be made;

d) Providing a plurality of variations of each footwear component, the footwear components comprising footwear uppers, footwear spring elements, at least one mechanical fastener, and footwear soles which are capable of being assembled to form the custom article of footwear using the at least one mechanical fastener, and each of the components being selectively interchangeable and being removable and replaceable;

e) Selecting a plurality of footwear components from the provided sources including at least an upper, a spring element, at least one mechanical fastener, and a sole which can be selectively removed and replaced;

f) Removably securing the plurality of footwear components including the upper, the spring element, and the sole in functional relation with the at least one selected mechanical fastener, thereby making the custom article of footwear; and,

g) Causing the custom article of footwear to be delivered to a designated address.

FIG. 45 is a medial cross-sectional side view of an alternate article of footwear 22 having outsole 43 portions affixed directly to the superior spring element 47 in the forefoot area 58 and/or midfoot area 67. Again, the superior spring element 47 can be made of a fiber composite material such as carbon fiber composite or a metal material such as titanium. The outsole 43 portions in the forefoot area 58 and also the midfoot area 67 can be affixed directly to the superior spring element 47 by conventional adhesives, and alternately, by self-adhesive means, or mechanical means. As shown in FIG. 47, the upper 23 includes a plurality of openings 72 for accommodating the outsole 43 portions,

thus when the superior spring element 47 including the outsole 43 portions is inserted into the upper 23 the outsole 43 portions pass through the plurality of openings 72 as the superior spring element 47 is placed into proper position. An insole 31 can then be inserted into the upper 23, and the article of footwear 22 can then be donned by a wearer. Alternately, the insole 31 can also be affixed to the superior spring element 47 and inserted into the upper 23 as a single unit. Further, a portion of the anterior side 33 of the superior spring element 47 can be inserted into a sleeve 39 of the upper 23 and thereby be retained in position, as discussed and shown in connection with FIG. 15. Moreover, a part including backing 30, or alternately, an anterior spring element 48.1 including a portion of the outsole 43 can be used near the anterior side 33 of the forefoot area 58, and be affixed with the use of mechanical engagement means including male and female parts, e.g., at least one hook 27 and opening 72, and/or a fastener 29, as shown in FIG. 46. The inferior portion of the upper 23 can be made of a strong and long wearing textile material such as KEVLAR®, or a NYLCO® ballistic multi-ply fabric such as "N-915W" having a protective polyurethane face coating distributed by Worthen Industries, Inc., of 3 East Spit Brook Road, Nashua N.H., and 530 Main Street, Clinton, Mass. These fabric materials can be hand cut, die cut, laser cut, or cut using other conventional means including the possible use of an automatic cutting table.

FIG. 46 is a medial cross-sectional side view of an alternate article of footwear 22 having outsole portions 43 affixed directly to the superior spring element 47 in the forefoot area 58, and further including a supplemental posterior spring element 49.1 in the rearfoot area 68. The addition of a supplemental posterior spring element 49.1 which can be selected from a range of alternate posterior spring elements 49.1 having different thickness or shapes enables the stiffness and mechanical properties of the superior spring element 47 in the rearfoot area 68 to be easily changed and customized. The possible greater relative thickness of the superior spring element 47 in combination with the supplemental posterior spring element 49.1 can be accommodated by stock-fitting it in the inferior portion of the insole 31, and by engineering the approximate thickness into the desired forefoot versus heel elevation differential. Also shown in FIG. 46 is the use of a part including backing 30, or alternately, an anterior spring element 48.1 including a portion of the outsole 43 near the anterior side 33 of the forefoot area 58. When affixed in position the backing 30, or alternately, an anterior spring element 48.1 thereby traps a portion of the upper 23 between the backing 30 or anterior spring element 48.1 and superior spring element 47. The backing 30, or alternately, an anterior spring element 48.1 can be affixed with the use of mechanical engagement means including male and female parts, e.g., at least one hook 27 and opening 72, and/or a fastener 29, as shown in FIG. 46. The fasteners 29 can be visible from the bottom side as shown in the forefoot area 58, or alternately not be visible, as shown in the rearfoot area 68 in FIG. 46.

FIG. 47 is a bottom view of the alternate article of footwear 22 shown in FIG. 45 having outsole 43 portions affixed directly to the superior spring element 47 in the forefoot area 58 and midfoot area 67. As shown in FIG. 47, the outsole 43 portions pass through openings 72 in the inferior side 38 of the upper 23. The portions of the upper 23 about the openings 72 can form relatively narrow links or bridges 97 connecting the opposing sides of the upper 23, thus still substantially maintain the shape, and integrity of upper 23. A wide variety of structures and patterns can be

used regarding the bridges 97 formed on the inferior side 38 of the upper 23. Shown in the rearfoot area 68 is inferior spring element 50 including posterior outsole element 46, a single fastener 29, and a locating pin 96. The locating pin 96 can be affixed to the inferior spring element 50, or alternately to the superior spring element 47 or posterior spring element 49 and be configured for passing through corresponding mating openings 72 in the various sub-components of the spring element 51. Further, the fastener 29 can be a loose part, or alternately can be affixed to one of the various sub-components of the spring element 51. Moreover, as shown in FIG. 101, the fastener 29 and/or locating pin 96 can have a round transverse cross-section, but at least one of these components preferably has a more complex geometric shape when viewed in a transverse cross-section, such as square, rectangle, pentagon, octagon, or star shape. Accordingly, the insertion of the fastener 29 and/or locating pin 96 can serve to lock the various sub-components of the spring element 50 into a specific geometric orientation so that they cannot be caused to shift or freely rotate about the axis of the fastener 29 and/or locating pin 96 when the sub-components are properly affixed in place.

FIG. 48 is a medial cross-sectional side view of an alternate article of footwear 22 having outside 43 portions affixed directly to an anterior spring element 48.1 in the footfoot area 58. Like the embodiment shown in FIG. 16, the superior spring element 47 is affixed to the anterior spring element 48.1 by fastener 29 thereby trapping and firmly securing an inferior portion of the upper 23 therebetween. However, the use of a single fastener 29 for securing the inferior spring element 50 and numerous gaps 98 between portions of the anterior outsole element 44 are shown in FIG. 48.

FIG. 49 is a medial cross-sectional side view of an alternate article of footwear 22 having outside 43 portions affixed directly to an anterior spring element 48.2 in the footfoot area 58 which is affixed to an anterior spacer 55.2 and the superior spring element 47. Again, the shape and thickness of an anterior spacer 55.2 in various locations can be varied so as to create a shaped shape, or other complex shapes along the longitudinal axis 69 or transverse axis 91 of the article of footwear 22. This can determine the relative position of the fulcrum created by the anterior spacer 55.2, but also the angular inclination, magnitude of deflection, and exhibited stiffness of the anterior spring element 48.2. As shown in FIG. 235, the inferior spring element 50 has a flexural axis 59 which is generally transverse to the longitudinal axis 69. Alternately, an inferior spring element 50 having a flexural axis 59 that is diagonal with respect to the longitudinal axis 69 could be used. In addition, as shown in FIG. 100, a midsole element 26 including a fluid-filled bladder can be employed in the space between the anterior spring element 48.2 and the inferior portion of the upper 23. When a gas-filled bladder is used, the gas contained within the bladder can be at ambient atmospheric pressure, or alternately, be pressurized above atmospheric pressure.

FIG. 50 is an exploded side view of a spring element 51 including a superior spring element 47 having an anterior spring element 48 and a posterior spring element 49, superior posterior spacer 42.1, and inferior posterior spacer 42.2, a fastener 29 including male and female portions, and an inferior spring element 50. The spacers 42.1 and 42.2 can be made in varying thickness and configurations and can be used to change the geometry and configuration of a spring element 51, as desired. Further, the spacers 42.1 and 42.2 can include gripping surfaces for firmly locking the components of a spring element 51 in position when affixed by

a fastener 29. Also shown is a fastener 29 affixed in position on the anterior spring element 48 and projecting beyond the inferior surface thereof. Accordingly, the inferior portion of this fastener 29 can be approximately flush, or alternately, can slightly protrude beyond the inferior portion of the upper 23 when the anterior spring element 48 is inserted in position. As shown, the posterior spring element 49 is positioned superior with respect to the anterior spring element 48 which in turn is positioned superior with respect to the inferior spring element 50.

FIG. 51 is an exploded side view of a spring element 51 including a superior spring element 47 having an anterior spring element 48 and a posterior spring element 49, superior posterior spacer 42.1, and inferior posterior spacer 42.2, a fastener 29 including male and female portions, and an inferior spring element 50. The spacers 42.1 and 42.2 can be made in varying thickness and configurations and can be used to change the geometry and configuration of a spring element 51, as desired. Further, the spacers 42.1 and 42.2 can include gripping surfaces for firmly locking the components of a spring element 51 in position when affixed by a fastener 29. Also shown is a fastener 29 affixed in position on the anterior spring element 48 that is flush with the inferior surface thereof. As shown, the anterior spring element 48 is positioned superior with respect to the posterior spring element 49 which in turn is positioned superior with respect to the inferior spring element 50.

FIG. 52 is an exploded side view of a spring element 51 including a superior spring element 47 having an anterior spring element 48 and a posterior spring element 49, superior posterior spacer 42.1, and inferior posterior spacer 42.2, a fastener 29 including male and female portions, and an inferior spring element 50. The spacers 42.1 and 42.2 can be made in varying thickness and configurations and can be used to change the geometry and configuration of a spring element 51, as desired. Further, the spacers 42.1 and 42.2 can include gripping surfaces for firmly locking the components of a spring element 51 in position when affixed by a fastener 29. Also shown is a fastener 29 affixed in position on the anterior spring element 48 that is flush with the inferior surface thereof. As shown, the posterior spring element 49 is positioned superior with respect to the inferior spring element 50 which in turn is positioned superior with respect to the anterior spring element 48. Further, the posterior spring element 49 includes a heel counter 24, and the anterior spring element 48 can include a side support 74 on the medial side 35 and/or the lateral side 36.

FIG. 53 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having an asymmetrical shape. The inferior spring element 50 has a more complex shape and diminished area on the lateral side 36 relative to the medial side 35, and can thereby exhibit less flexural modulus or stiffness in bending on the lateral side 36.

FIG. 54 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having an asymmetrical shape. The inferior spring element 50 has a more complex shape and diminished area on the medial side 35 relative to the lateral side 36, and can thereby exhibit less flexural modulus or stiffness in bending on the medial side 35.

FIG. 55 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape. The inferior spring element 50 is affixed

to the superior spring element 47 by a single fastener 29 that can be quickly and easily affixed by a wearer in order to service, renew or customize the spring element 51 and associated article of footwear.

FIG. 56 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape and showing an alternate medial mounting position. The superior spring element 47 can include several alternate openings 72 at different positions along the same transverse axis 91 for accommodating the fastener 29. The same inferior spring element 50 can be affixed in several alternate positions, or alternately, various inferior spring elements 50 having a different configurations, such as inferior spring elements having greater width along the transverse axis 91, can be affixed into position. Accordingly, the configuration and mechanical properties of the spring element 51 can be readily adapted in order to customize exhibited performance for an individual wearer. The configuration shown in FIG. 56 can decrease the effective lever arm present at the lateral posterior corner of the inferior spring element 50.

FIG. 57 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape and showing an alternate lateral mounting position. The superior spring element 47 can include several alternate openings 72 at different positions along the same transverse axis 91 for accommodating the fastener 29. The same inferior spring element 50 can be affixed in several alternate positions, or alternately, various inferior spring elements 50 having a different configurations, such as inferior spring elements having greater width along the transverse axis 91, can be affixed into position. Accordingly, the configuration and mechanical properties of the spring element 51 can be readily adapted in order to customize performance for an individual wearer. The configuration shown in FIG. 57 can increase the effective lever arm present at the lateral posterior corner of the inferior spring element 50.

FIG. 58 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape and showing an alternate mounting angle. The fastener 29 and any openings 72 therefore in the spring element 51 can have complex geometric shapes such as pentagon, hexagon, octagon, or star shape, or alternately, the fastener 29 and spring element 51 can include mating male and female surfaces which permit them to engage one another at various angular increments. Accordingly, the configuration and mechanical properties of the spring element 51 can be readily adapted in order to customize performance for an individual wearer. As shown in FIG. 58, the inferior spring element 50 is directed towards the medial side 35, and this will tend to decrease the effective lever arm present at the lateral posterior corner of the inferior spring element 50.

FIG. 59 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape and showing an alternate mounting angle. The fastener 29 and any openings 72 therefore in the spring element 51 can have complex geometric shapes such as pentagon, hexagon, octagon, or star shape, or alternately, the fastener 29 and spring element 51 can include mating male and female surfaces which permit them to engage one another at various selected angular increments. Accordingly,

the configuration and mechanical properties of the spring element 51 can be readily adapted in order to customize performance for an individual wearer. As shown in FIG. 59, the inferior spring element 50 is directed towards the lateral side 36, and this will tend to increase the effective lever arm present at the lateral posterior corner of the inferior spring element 50.

FIG. 60 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape and showing an alternate medial mounting position. The inferior spring element 50 can be affixed at one of several alternate positions along the same transverse axis 91, and also be affixed at various selected angular increments.

FIG. 61 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape and showing an alternate lateral mounting position. The inferior spring element 50 can be affixed at one of several alternate positions along the same transverse axis 91, and also be affixed at various selected angular increments.

FIG. 62 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape, and showing an alternate more anterior mounting position. The superior spring element 47 can include several alternate openings 72 and positions along the same longitudinal axis 69 for affixing the inferior spring element 50 thereto. This can permit a given superior spring element 47 and inferior spring element 50 to be used with several different size length articles of footwear, and can also be used to customize the configuration and performance of the spring element 51. Generally, the configuration shown in FIG. 62 will tend to decrease the effective lever arm present at the lateral posterior corner of the inferior spring element 50.

FIG. 63 is a bottom plan view of a spring element 51 for use in an article of footwear 22 having a superior spring element 47 and an inferior spring element 50 having a symmetrical shape and showing an alternate more posterior mounting position. The superior spring element 47 can include several alternate openings 72 and positions along the same longitudinal axis 69 for affixing the inferior spring element 50 thereto. This can permit a given superior spring element 47 and inferior spring element 50 to be used with several different size length articles of footwear, and can also be used to customize the configuration and performance of the spring element 51. Generally, the configuration shown in FIG. 63 will tend to increase the effective lever arm present at the lateral posterior corner of the inferior spring element 50.

FIG. 64 is a top plan view of a superior spring element 47 having a surface including affixing means. The superior spring element 47 can include a surface having texture, roughness, or protuberances 99 for enhancing or effecting a mechanical bond. Further, the superior spring element 47 can include a tactified or adhesive surface 100. In this regard, a self-adhesive surface which can be exposed by removal of a peel-ply layer 149 can be used. It can be readily understood that a surface including affixing means can be used with any or all sub-components of a spring element 51, and also the upper 23 of an article of footwear 22.

FIG. 65 is a bottom plan view of a spring element including a superior spring element 47 and an inferior spring element 50 having a notch 71 and a longitudinal slit 82. As

shown, the longitudinal slit 82 partially bisects the inferior spring element 50. When an article of footwear 22 including the inferior spring element 50 is loaded near the lateral posterior corner the stiffness in bending is reduced relative to an otherwise similar inferior spring element 50 which does not include the longitudinal slit 82. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 66 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element consisting of two separate portions 50.1 and 50.2. The configuration and physical properties of each portion 50.1 and 50.2 can thereby be individually varied and customized for optimal performance.

FIG. 67 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having a notch 71 and diagonal slit 82 that starting on the medial side 35 partially traverses the inferior spring element 50. The diagonal slit 82 creates a line of flexion 54 that reduces the flexural modulus or stiffness in bending exhibited by the inferior spring element 50 at the lateral posterior corner. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 68 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having two notches 71. The two notches 71 approximately oppose one another forming a line of flexion 54 that is diagonal with respect to the longitudinal axis 69 of the inferior spring element 50. The diagonal line of flexion 54 reduces the flexural modulus or stiffness in bending exhibited by the inferior spring element 50 at the lateral posterior corner. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 69 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having a slit 82. The slit 82 forms a line of flexion 54 that is diagonal with respect to the longitudinal axis 69 of the inferior spring element 50. The diagonal line of flexion 54 reduces the flexural modulus or stiffness in bending exhibited by the inferior spring element 50 at the lateral posterior corner. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 70 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having an opening 72. The opening 72 can be circular or oval shaped and is centrally positioned under the weight bearing center of a wearer's heel 57. The presence of opening 72 will decrease the flexural modulus or stiffness in bending and including the exhibited torsional stiffness exhibited by the inferior spring element 50. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 71 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having an opening 72. The opening 72 is asymmetrical and elongated such as to reduce the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 of the line of flexion 54 created thereby. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 72 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having an opening 72. The opening 72 is asymmetrical and elongated such as to reduce the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 of the line of flexion 54 created thereby. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 73 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal a midsole 26 cushioning element and an inferior spring element 50. The midsole 26 cushioning element can include or substantially consist of a fluid-filled bladder 101. It can be readily understood that a fluid-filled bladder 101 can contain a gas, liquid, or viscous material pressurized at ambient atmospheric pressure, or alternately, above atmospheric pressure. Published examples of fluid-filled bladders for possible use in articles of footwear include, but are not limited to: U.S. Pat. No. 5,930,918 and U.S. Pat. No. 5,363,570 assigned to Converse, Inc.; U.S. Pat. No. 5,704,137, U.S. Pat. No. 5,191,727, U.S. Pat. No. 5,097,607, and U.S. Pat. No. 4,934,072 assigned to Brooks Sports, Inc.; U.S. Pat. No. 5,718,063, U.S. Pat. No. 5,493,792, U.S. Pat. No. 5,155,927, and U.S. Pat. No. 4,768,295 assigned to Asics Corporation; U.S. Pat. No. 5,197,206, U.S. Pat. No. 5,197,207, and U.S. Pat. No. 5,197,207, and U.S. Pat. No. 5,201,125 assigned to Puma AG. Rudolf Dales Sport; U.S. Pat. No. 5,598,645 assigned to Adidas International B.V.; U.S. Pat. No. 5,369,896, and U.S. Pat. No. 6,041,521 assigned to Fila Holdings SpA.; U.S. Pat. No. 4,217,705, U.S. Pat. No. 4,370,754, U.S. Pat. No. 4,441,211, U.S. Pat. No. 4,453,271, U.S. Pat. No. 4,486,901, U.S. Pat. No. 4,513,449, U.S. Pat. No. 4,874,640, and U.S. Pat. No. 5,235,715 granted to Byron Donzis; U.S. Pat. No. 4,926,503, U.S. Pat. No. 4,985,931, U.S. Pat. No. 5,029,341, U.S. Pat. No. 5,035,009, and U.S. Pat. No. 5,036,761 granted to J. C. Wing; U.S. Pat. No. 5,572,804, U.S. Pat. No. 5,976,451, U.S. Pat. No. 6,029,962, and U.S. Pat. No. 6,098,313 granted to Joseph Skaja and/or Martin Shorten; U.S. Pat. No. 4,183,156, U.S. Pat. No. 4,219,945, U.S. Pat. No. 4,271,606, U.S. Pat. No. 4,287,250, U.S. Pat. No. 4,340,626, U.S. Pat. No. 4,906,502, U.S. Pat. No. 4,936,029, U.S. Pat. No. 5,042,176, U.S. Pat. No. 5,083,361, and U.S. Pat. No. 5,543,194 granted to Marion F. Rudy; U.S. Pat. No. 6,161,240 granted to Ing-Jing Huang, and, U.S. Pat. No. 4,817,304, U.S. Pat. No. 5,406,719, U.S. Pat. No. 5,592,706, U.S. Pat. No. 5,425,184, U.S. Pat. No. 5,595,004, U.S. Pat. No. 5,625,964, U.S. Pat. No. 5,755,001, U.S. Pat. No. 5,802,739, U.S. Pat. No. 5,833,630, U.S. Pat. No. 5,979,078, U.S. Pat. No. 5,987,780, U.S. Pat. No. 5,993,585, U.S. Pat. No. 6,013,340, U.S. Pat. No. 6,020,055, U.S. Pat. No. 6,055,746, U.S. Pat. No. 6,082,025, U.S. Pat. No. 6,119,371, U.S. Pat. No. 6,127,026, U.S. Pat. No. 6,161,240, U.S. Pat. No. 6,258,421 B1, U.S. Pat. No. 6,321,465 B1, U.S. Pat. No. 6,430,843 B1, EP 0752216 A3, WO 01/0060 A2, WO 01/0061 A2, WO 01/0062 A2, WO 01/0063 A2, WO 01/0064 A2, and, WO 01/078539 A2, which are assigned to Nike, Inc., all of the recited patents and patent applications in this paragraph hereby being incorporated by reference herein. In particular, fluid-filled bladders including valves that can provide a motion control device such as taught in the above recited patent application WO 01/0061 A2, and fluid-filled bladders comprising a dynamically-controlled cushioning system, as taught in the above recited patent

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application WO 01/78539 A2, can be used. In the latter case, an article of footwear can include at least one fluid-filled bladder including a plurality of chambers, a control system possibly including a CPU, a pressure detector, and a regulator for modulating the level of fluid communication between different fluid-filled bladders or chambers. It can be readily understood that the fluid-filled bladders taught in the recited patents and patent applications, and the like, could be used in combination with a spring element 51, e.g., various alternate embodiments shown in FIGS. 73-82, 96-100, and 115-117.

Alternately, a midsole 26 cushioning element can also be made of a foam rubber or plastic material such as polyurethane or ethylene vinyl acetate. In addition, the midsole 26 can simultaneously comprise a posterior spacer 42. As shown in FIG. 73, a midsole 26 cushioning element can occupy substantially the entire space, area, and volume between the superior spring element 47 and the inferior spring element 50 posterior of the flexural axis 59. Alternatively, a midsole 26 cushioning element can occupy a portion of the space, area, and volume between a superior spring element 47 and inferior spring element 50, as shown, e.g., in FIGS. 74-82, 96-98, 118-120, and the like.

FIG. 74 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal a midsole 26 cushioning element and an inferior spring element 50. The midsole 26 cushioning element can be made of a fluid-filled bladder 101. It can be readily understood that a fluid-filled bladder 101 can contain a gas, liquid, or viscous material pressurized at ambient atmospheric pressure, or alternately, above atmospheric pressure. Alternately, the midsole 26 cushioning element can be made of a foam rubber or plastic material such as polyurethane or ethylene vinyl acetate. In addition, the midsole 26 can simultaneously comprise a posterior spacer 42. The termination of the midsole 26 at the relatively linear line of flexion 54 which is diagonal with respect to the longitudinal axis 69 creates an additional fulcrum associated with bending of the inferior spring element 50. As shown in FIG. 74, the midsole 26 encompasses substantially the entire space, area, and volume between the superior spring element 47 and the inferior spring element 50 posterior of the flexural axis 59 and anterior of the line of flexion 54. The flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 and posterior of the line of flexion 54 can thereby be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 75 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal a midsole 26 cushioning element and an inferior spring element 50. The midsole 26 cushioning element can be made of a fluid-filled bladder 101. It can be readily understood that a fluid-filled bladder 101 can contain a gas, liquid, or viscous material pressurized at ambient atmospheric pressure, or alternately, above atmospheric pressure. Alternately, the midsole 26 cushioning element can be made of a foam rubber or plastic material such as polyurethane or ethylene vinyl acetate. In addition, the midsole 26 can simultaneously comprise a posterior spacer 42. The termination of the midsole 26 at the arcuate line of flexion 54 creates an additional fulcrum associated with bending of the inferior spring element 50. As shown in FIG. 74, the midsole 26 encompasses substantially the entire space, area, and volume

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between the superior spring element 47 and the inferior spring element 50 posterior of the flexural axis 59 and anterior of the arcuate line of flexion 54. The flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 and posterior of the line of flexion 54 can thereby be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 76 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal a midsole 26 cushioning element and an inferior spring element 50. The midsole 26 cushioning element can be made of a fluid-filled bladder 101. It can be readily understood that a fluid-filled bladder 101 can contain a gas, liquid, or viscous material pressurized at ambient atmospheric pressure, or alternately, above atmospheric pressure. Alternately, the midsole 26 cushioning element can be made of a foam rubber or plastic material such as polyurethane or ethylene vinyl acetate. In addition, the midsole 26 can simultaneously comprise a posterior spacer 42. The termination of the midsole 26 at the arcuate line of flexion 54 creates an additional fulcrum associated with bending of the inferior spring element 50. As shown in FIG. 74, the midsole 26 encompasses substantially the entire space, area, and volume between the superior spring element 47 and the inferior spring element 50 posterior of the flexural axis 59 and anterior of the arcuate line of flexion 54. The flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 and posterior of the line of flexion 54 can thereby be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 77 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal a column shaped midsole 26 cushioning element and an inferior spring element 50. Again, a midsole 26 cushioning element can consist of a fluid-filled bladder, or a foam material. As shown, the single midsole 26 cushioning element has an oval or elliptical shape in a top plan view. However, it can be readily understood that a single midsole 26 cushioning element can have other geometric shapes. As shown, the midsole 26 cushioning element is located on the medial side 35. The relative flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 can thereby be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 78 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal two column shaped midsole 26 cushioning elements and an inferior spring element 50. Again, a midsole 26 cushioning element can consist of a fluid-filled bladder, or a foam material. As shown, the two midsole 26 cushioning elements have a circular shape in a top plan view. However, it can be readily understood that the two midsole 26 cushioning elements can have other geometric shapes. As shown, the midsole 26 cushioning elements are located on the medial side 35. The relative flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 can thereby

be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 79 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior the flexural axis 59 in order to reveal three column shaped midsole 26 cushioning elements and an inferior spring element 50. Again, a midsole 26 cushioning element can consist of a fluid-filled bladder, or a foam material. As shown, the three midsole 26 cushioning elements have a circular shape in a top plan view. However, it can be readily understood that the three midsole 26 cushioning elements can have other geometric shapes. As shown, the midsole 26 cushioning elements are located on the medial side 35. The relative flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 can thereby be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 80 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal six column shaped midsole 26 cushioning elements and an inferior spring element 50. Again, a midsole 26 cushioning element can consist of a fluid-filled bladder, or a foam material. As shown, the column shaped midsole 26 cushioning elements are symmetrically positioned on both the medial side 35 and lateral side 36, and the midsole 26 cushioning elements have a circular shape in a top plan view. However, it can be readily understood that the midsole 26 cushioning elements can have other geometric shapes. If desired, at least the posteriormost midsole 26 cushioning element on the lateral side 36 can be made of a composition as to exhibit less stiffness in compression than those on the medial side 35. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 81 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal five column shaped midsole 26 cushioning elements and an inferior spring element 50. Again, a midsole 26 cushioning element can consist of a fluid-filled bladder, or a foam material. The midsole 26 cushioning elements have a circular shape in a top plan view. However, it can be readily understood that the midsole 26 cushioning elements can have other geometric shapes. As shown, three of the column shaped midsole 26 cushioning elements are positioned on the medial side 35 and two of the column shaped midsole 26 cushioning elements are positioned on the lateral side 36. The relative flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 can thereby be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 82 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal a midsole 26 cushioning element including an opening 72 and an inferior spring element 50. Again, a midsole 26 cushioning element can consist of a fluid-filled bladder, or alternately and as shown in FIG. 82, the midsole 26 cushioning element can consist of a foam material. As shown, the midsole 26 cushioning element encompasses a significant portion of the space, area, and volume between the superior

spring element 47 and the inferior spring element 50 posterior of the flexural axis 59. However, the void space or opening 72 is asymmetrically positioned closer to the lateral side 36 than the medial side 35, thus the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the lateral side 36 can thereby be decreased. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

10 FIG. 83 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal an inferior spring element 50 having convex peak 92 portions and concave valley 93 portions extending longitudinally on the medial side. The presence of convex peak 92 portions and concave valley 93 portions can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

15 FIG. 84 is a cross-sectional view along line 84—84 of the inferior spring element 50 shown in FIG. 83 having convex peak 92 portions and concave valley 93 portions.

FIG. 85 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element 50 having an extension 94 on the medial side 35. As shown, the extension 94 projects both above and below the two planes formed by the superior side 37 and inferior side 38 of the inferior spring element 50. The presence of an extension 94 can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

20 FIG. 86 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element 50 having an extension 94 on the medial side 35. As shown, the extension 94 projects above the plane formed by the superior side 37 of the inferior spring element 50. The presence of an extension 94 can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

25 FIG. 87 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element 50 having an extension 94 on the medial side 35. As shown, the extension 94 projects below the plane formed by the inferior side 38 of the inferior spring element 50. The presence of an extension 94 can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

30 FIG. 88 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element 50 having an concave peaks 92 and convex valleys 93 on the superior side 37. The presence of convex peaks 92 and concave valleys 93 can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral

side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 89 is a cross-sectional view similar to that shown in FIG. 84 of an alternate inferior spring element 50 having greater thickness on the medial side 35. The presence of greater thickness can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 90 is a top plan view of a spring element 51 including a superior spring element 47 with parts broken away posterior of the flexural axis 59 in order to reveal an inferior spring element 50 having convex peaks 92 and concave valleys 93 extending transversely from the medial side 35. The presence of convex peaks 92 and concave valleys 93 can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 91 is a side view of a spring element 51 similar to that shown in FIG. 90 including a superior spring element 47 and an inferior spring element 50 including inserts 95 such as dowels and convex peaks 92 and concave valleys 93. An insert 95 can consist of a relatively light-weight material which can create or quickly build a desired generally planar thickness or convex peak 92 when substantially encapsulated by a fiber composite material. The presence of convex peaks 92 and concave valleys 93 can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 92 is a side view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 including convex peaks 92 and concave valleys 93. The presence of convex peaks 92 and concave valleys 93 can increase the flexural modulus or stiffness in bending, and including the torsional stiffness exhibited by the inferior spring element 50 on the medial side 35 relative to the lateral side 36. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 93 is a top perspective view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 showing a cross-section taken along line 94—94. The inferior spring element 50 can be affixed to the superior spring element 47 at one or more locations proximate its anterior side, and the inferior spring element 50 can then gradually and evenly project downwards from the superior spring element 47 on the medial side 35 and lateral side 36. Accordingly, the configuration and relationship between the inferior spring element 50 and superior spring element 47 can appear as shown in the transverse cross-sectional view shown in FIG. 94.

FIG. 94 is a cross-sectional view of the spring element 51 shown in FIG. 93 taken along line 94—94.

FIG. 95 is a transverse cross-sectional view of an alternate spring element 51 taken along a line similar to 94—94 shown in FIG. 93. Again, the inferior spring element 50 can be affixed to the superior spring element 47 at one or more

locations near its anterior side. However, the inferior spring element 50 projects downwards from the superior spring element 47 on the medial side 35 unevenly relative to the lateral side 36. Accordingly, the configuration and relationship between the inferior spring element 50 and superior spring element 47 can appear as shown in the transverse cross-sectional view shown in FIG. 95. As shown, the inferior spring element 50 is sloped upwards from the lateral side 36 to the medial side 35. Accordingly, when the inferior spring element 50 is loaded at the lateral and posterior corner during the walking or running gait cycle, the inferior spring element 50 can exhibit greater counter-clockwise movement and torsional stiffness. In particular, when the inferior spring element 50 is affixed near its anterior end at a single and central location, the medial side 35 of the inferior spring element 50 can move counter-clockwise and exert force upon the support surface thereby actively posting and supporting the medial side 35.

FIG. 96 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 including a midsole 26 cushioning element affixed to both the superior spring element 47 and the inferior spring element 50. Alternately, the midsole 26 cushioning element can be affixed only to the superior spring element 47, or alternately, the midsole 26 cushioning element can only be affixed to the inferior spring element 50. The midsole 26 cushioning element shown in FIG. 96 can generally resemble that shown in FIG. 77.

FIG. 97 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 including two midsole 26 cushioning elements affixed to the superior spring element 47. Alternately, the midsole 26 cushioning element can be affixed only to the inferior spring element 50, or alternately, the midsole 26 cushioning element can be affixed to both the inferior spring element 50 and superior spring element 47. The midsole 26 cushioning element shown in FIG. 97 can generally resemble those shown in FIG. 78.

FIG. 98 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 including three midsole 26 cushioning elements affixed to the inferior spring element 50. Alternately, the midsole 26 cushioning element can be affixed only to the superior spring element 47, or alternately, the midsole 26 cushioning element can be affixed to both the inferior spring element 50 and superior spring element 47. The midsole 26 cushioning elements shown in FIG. 98 can generally resemble those shown in FIGS. 79, 80, 81. In addition, the height of the various midsole 26 cushioning elements can be the same, or alternately, the height of the midsole 26 cushioning elements can vary, thus introducing both a fulcrum and a distinct change in the exhibited stiffness of the spring element 51 in various stages. Accordingly, one or more of the midsole 26 cushioning elements can be loaded at the same time, or at different times during the gait cycle. As a result, the rate and magnitude of rearfoot pronation experienced by a wearer of an associated article of footwear 22 can be reduced.

FIG. 99 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 including a midsole 26 cushioning element comprising a fluid-filled bladder affixed between the superior spring element 47 and the inferior spring element 50. The midsole 26 cushioning element comprising a fluid-filled bladder 101 can generally resemble that shown in FIG. 73. It can be readily understood that a fluid-filled bladder 101 can contain a gas, liquid, or viscous material pressurized at ambient atmospheric pressure, or alternately, above atmospheric pressure. As shown in FIG. 73, the midsole 26 encompasses substantially the entire space, area, and volume between the superior spring element

47 and the inferior spring element 50 posterior of the flexural axis 59. However, the midsole 26 can encompass a portion of the space, area, and volume between the superior spring element 47 and the inferior spring element 50 posterior of the flexural axis 59, as shown in FIGS. 74-82, and many other configurations are possible.

FIG. 100 is a longitudinal cross-sectional medial side view of an alternate article of footwear 22 including a midsole 26 cushioning element comprising a first posterior fluid-filled bladder 101.1 affixed between the superior spring element 47 and the inferior spring element 50 in the rearfoot area 68, and a second anterior fluid-filled bladder 101.2 affixed between the superior spring element 47 and an inferior anterior spring element 48.2 in the forefoot area 58. The alternate article of footwear 22 shown in FIG. 100 can be generally similar to that shown in FIG. 49, but with the addition of fluid-filled bladders 101.1 and 101.2. It can be readily understood that a fluid-filled bladder can contain a gas, liquid, or viscous material pressurized at ambient atmospheric pressure, or alternately, above atmospheric pressure. As shown in FIG. 100, the midsole 26 cushioning elements encompass substantially the entire space, area, and volume between the superior spring element 47 and the inferior spring element 50 posterior of the flexural axis 59, but also substantially the entire space, area, and volume between the superior spring element 47 and the inferior anterior spring element 48.2 posterior of the anterior position of attachment behind the anterior spacer 55.2. Alternately, the midsole 26 cushioning elements can encompass only a portion of the space, area, and volume between the superior spring element 47 and the inferior spring element 50, and/or the superior spring element 47 and the inferior anterior spring element 48.2, thus many other configurations are possible.

FIG. 101 is a perspective exploded view of a spring element 51 including a superior spring element 47, and an inferior spring element 50 showing a fastener 29 and a locating pin 96. The superior spring element 47 and inferior spring element 50 can both include registered openings 72 having a shape such as a square, rectangle, diamond, triangle, pentagon, octagon, star, or other non-circular complex shape which can thereby be mechanically engaged and locked in position with respect to the fastener 29. In addition, a locating pin 96 can also be used to align and maintain the superior spring element 47 and inferior spring element 50 in proper position. The locating pin 96 can possibly be affixed to either the superior spring element 47 or inferior spring element 50, and can possibly pass through the upper 23 of an article of footwear 22 before engaging a corresponding component of the spring element 51.

FIG. 102 is a bottom plan view of a spring element 51 including a superior spring element 51 and an inferior spring element 50 having an insert 95. The insert 95 can be made of metal such as titanium or spring steel and can serve to increase the flexural modulus or stiffness in bending and also the torsional stiffness of the inferior spring element 50 on the medial side 35 relative to more substantial use of a fiber composite material 102 on the lateral side 36. The insert 95 can be partially or completely encapsulated by a fiber composite material 102.

FIG. 103 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having a different fiber composite material 102.1 on the medial side 35 than the fiber composite material 102.2 used on the lateral side 36. For example, a uni-directional carbon fiber composite material 102.1 could be used on the medial side 35, whereas a woven carbon fiber composite material 102.2 could be used on the lateral side 36. This can

serve to increase the flexural modulus or stiffness in bending and also the torsional stiffness of the inferior spring element 50 on the medial side 35 relative to the lateral side 36.

FIG. 104 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having different fiber composite materials on the medial side 35 than on the lateral side 36. For example, a uni-directional carbon fiber composite material could be used on the medial side 35, whereas a fiberglass material could be used on the lateral side 36. This can serve to increase the flexural modulus or stiffness in bending and also the torsional stiffness of the inferior spring element 50 on the medial side 35 relative to the lateral side 36.

FIG. 105 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having different fiber composite material 102 orientations on the medial side 35 than on the lateral side 36. For example, on the medial side 35, when an inferior spring element 50 substantially consisting of uni-directional carbon fiber composite material 102 is being constructed, the direction of the fibers in one layer can be orientated parallel with respect to the longitudinal axis 69 or at 0 degrees, and the next layer can be orientated at about 45 degrees to the right, and then the next layer at about 45 degrees to the left. This sequence can then be repeated until the part is constructed to the desired thickness. If desired, on the lateral side 36, a greater number of the layers can be orientated between 0 degrees and 45 or 90 degrees right, as opposed to 0 degrees and 45 or 90 degrees left, as this can reduce the flexural modulus or stiffness in bending exhibited by the inferior spring element 50, since uni-directional carbon fiber composite materials normally exhibit greatest stiffness when bending at 90 degrees relative to the orientation of the fibers. This can serve to increase the flexural modulus or stiffness in bending and also the torsional stiffness of the inferior spring element 50 on the medial side 35 relative to the lateral side 36, and create a line a flexion 54.

FIG. 106 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having an uni-directional fiber composite material 102.1 oriented differently on the medial side 35, lateral side 36, and posterior side 34, than in the middle portion 105. In this alternate embodiment, the middle portion 105 can be constructed by alternating the orientation of the layers at 0 degrees, 45 degrees right, and 45 degrees left in a continuous sequences, whereas the medial side 35, lateral side 36, and posterior side 34 can omit layers at 45 degrees left and right, and instead possibly use a greater number of layers at 0 degrees. The resulting inferior spring element 50 can exhibit less stiffness in bending at the medial, lateral, and posterior sides and edges than in the middle 105. This could be advantageous with regards to reducing the stiffness in bending even if not the actual length of the effective lever arm created by the sole of an associated article of footwear 22, thus reduce the magnitude of pronation or supination exhibited in certain lateral movement applications of the article of footwear such as tennis, volleyball, or basketball. However, a dramatic reduction in the stiffness of the sole about the medial side 35, lateral side 36, and posterior sides 34 can at some point prove counter-productive and result in instability, and so ideally, the stiffness variable should be optimized and customized for use by an individual wearer for use in the particular targeted activity.

FIG. 107 is a top plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 made of a metal material. The metal material can substantially consist of a titanium alloy, or spring steel. The

inferior spring element 50 can be cut and formed in a single part from a flat sheet stock of titanium alloy by bending the piece about the flexural axis 59, or alternately, the inferior spring element 50 can be stamped, forged, cast or molded into the desired shape.

FIG. 108 is a cross-sectional view of the spring element 51 shown in FIG. 107 taken along line 108—108.

FIG. 109 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 made of a metal material. The metal material can substantially consist of a titanium alloy, or spring steel. The spring element 51 can be cut and formed in a single part from a flat sheet stock of titanium alloy by bending the piece about a generally longitudinal flexural axis 59.1 on the medial side 35 and also about a generally longitudinal flexural axis 59.2 on the lateral side 36. Alternately, the inferior spring element 50 can be stamped, forged, cast or molded into the desired shape. The inferior spring element 50 can have relatively greater separation from the superior spring element 47 near the posterior side 34 than near the anterior side 33.

FIG. 110 is a cross-sectional view of the spring element 51 shown in FIG. 109 taken along line 110—110.

FIG. 111 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having a symmetrical cantilever shape. The middle portion 105 of the inferior spring element 50 is generally planar and can lie flat against a portion of the superior spring element 47 when the two components are affixed together. However, the medial side 35, lateral side 36, and posterior side 34 of the inferior spring element 50 descend in an arcuate fashion from the middle portion 105 to form a cantilever shape whereby the inferior spring element 50 has a concave configuration when viewed in a transverse cross-section, as shown in FIG. 112.

FIG. 112 is a cross-sectional view of the spring element 51 shown in FIG. 111 taken along line 112—112, and is shown with the superior side 37 up.

FIG. 113 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 having an asymmetrical cantilever shape. The middle portion 105 of the inferior spring element 50 is generally planar and can lie flat against a portion of the superior spring element 47 when the two components are affixed together. However, the medial side 35, lateral side 36, and posterior side 34 of the inferior spring element 50 descend in an arcuate fashion from the middle portion 105 to form a cantilever shape whereby the inferior spring element 50 has a concave configuration when viewed in a transverse cross-section, as shown in FIG. 114.

FIG. 114 is a cross-sectional view of the spring element 51 shown in FIG. 113 taken along line 114—114, and shown with the superior side 37 up. It can be seen by comparing FIGS. 111 and 113, and their corresponding cross-sectional views shown in FIGS. 112 and 114, that the inferior spring element 50 shown in FIGS. 113 and 114 has an asymmetric shape. The length of the lever arm of the inferior spring element 50 on the medial side 35 is shorter than that present on the lateral side 36, and at the lateral and posterior corner. This can serve to enhance the flexural modulus or stiffness in bending and also the torsional stiffness of the inferior spring element 50 on the medial side 35 relative to the lateral side 36, and create a line a flexion 54.

FIG. 115 is a cross-sectional view of the spring element 51 shown in FIG. 74 taken along line 115—115. A midsole 26 cushioning element consisting of a fluid-filled bladder 101 is located between the superior spring element 47 and

inferior spring element 50. The fluid-filled bladder 101 can extend posteriorly to greater degree on the medial side 35 in order to create differential stiffness relative to the lateral side 36 and rearfoot strike zone.

FIG. 116 is a cross-sectional view of the spring element 51 shown in FIG. 75 taken along line 116—116. A midsole 26 cushioning element consisting of a fluid-filled bladder 101 is located between the superior spring element 47 and inferior spring element 50. The fluid-filled bladder 101 can extend posteriorly to greater degree on the medial side 35 in order to create differential stiffness relative to the lateral side 36 and rearfoot strike zone.

FIG. 117 is a cross-sectional view of the spring element 51 shown in FIG. 74 taken along line 117—117. A midsole 26 cushioning element consisting of a fluid-filled bladder 101 is located between the superior spring element 47 and inferior spring element 50. The fluid-filled bladder 101 can extend posteriorly on the medial side 35 in order to create differential stiffness relative to the lateral side 36 and rearfoot strike zone.

FIG. 118 is a cross-sectional view of an alternate spring element 51 taken along a line similar to 115 shown in FIG. 74. In this alternate embodiment, a midsole 26 cushioning element consisting of a foam material is located between the superior spring element 47 and inferior spring element 50 on the medial side 35. The inferior spring element 50 is affixed to the superior spring element 47 on the medial side 35, and the inferior spring element 50 then descends to a position of maximum separation from the superior spring element 47 at the lateral side 36. The midsole 26 cushioning element consisting of foam material supports the spring element 51 on the medial side 35, and an outsole 43 can underlie at least a portion of the foam material and spring element 51.

FIG. 119 is a cross-sectional view of an alternate spring element 51 taken along a line similar to 116 shown in FIG. 75. In this alternate embodiment, a midsole 26 cushioning element consisting of a foam material is located between the superior spring element 47 and inferior spring element 50 on the medial side 35. The inferior spring element 50 is affixed to the superior spring element 47 on the medial side 35, and the inferior spring element 50 then descends to a position of maximum separation from the superior spring element 47 at the lateral side 36. The midsole 26 cushioning element consisting of foam material supports the spring element 51 on the medial side 35, and an outsole 43 can underlie at least a portion of the foam material and spring element 51.

FIG. 120 is a cross-sectional view of an alternate spring element 51 taken along a line similar to 117 shown in FIG. 76. In this alternate embodiment, a midsole 26 cushioning element consisting of a foam material is located between the superior spring element 47 and inferior spring element 50 on the medial side 35. The inferior spring element 50 is affixed to the superior spring element 47 on the medial side 35, and the inferior spring element 50 then descends to a position of maximum separation from the superior spring element 47 at the lateral side 36. The midsole 26 cushioning element consisting of foam material supports the spring element 51 on the medial side 35, and an outsole 43 can underlie at least a portion of the foam material and spring element 51.

FIG. 121 is a side view of a spring element 51 including a superior spring element 47 including a heel counter 24, side support 74 and an inferior spring element 50.

FIG. 122 is a cross-sectional view taken along line 122—122 of the superior spring element 47 shown in FIG. 121. The superior spring element 47 includes a side support 74 on the medial side 35.

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FIG. 123 is a cross-sectional view taken along line 123—123 of the superior spring element 47 shown in FIG. 121. The superior spring element 47 includes a heel counter 24 that provides support to both the medial side 35 and lateral side 36.

FIG. 124 is a cross-sectional view of an alternate superior spring element 47 taken along a line similar to 122 shown in FIG. 121. The superior spring element 47 includes side supports 74 on both the medial side 35 and lateral side 36.

FIG. 125 is a cross-sectional view of an alternate superior spring element 47 taken along a line similar to 122 shown in FIG. 121. The superior spring element 47 has an arcuate shape generally corresponding to the anatomical shape of a wearer's foot and includes side supports 74 on both the medial side 35 and lateral side 36.

FIG. 126 is a bottom plan view of a spring element 51 generally similar to that shown in a side view in FIG. 49 including a superior spring element 47, an inferior anterior spring element 48.2, and an inferior spring element 50. The inferior anterior spring element 48.2 is affixed by three fasteners 29 directly to the superior spring element 47 near the anterior side 33. The inferior spring element 50 is also affixed to the superior spring element 47 by a fastener 29. The approximate position of the metatarsal-phalangeal joints of a wearer's foot corresponding to the spring element 51 and an associated article of footwear 22 is normally slightly less than 70 percent of the length of an article of footwear 22 measured from the posterior side 34 on the medial side 35, and greater than 60 percent of the length of an article of footwear 22 as measured from the posterior side 34 on the lateral side 36, but still somewhat less than on the medial side 35, as shown by line 104.

FIG. 127 is a bottom plan view of a spring element 51 generally similar to that shown in a side view in FIG. 49 including a superior spring element 47, an inferior anterior spring element 48.2, and an inferior spring element 50. The inferior anterior spring element 48.2 is affixed by three fasteners 29 to the anterior spacer 55.2 and the superior spring element 47 near the anterior side 33. As shown in FIG. 127, the posteriomost portion of the anterior spacer 55.2 upon which the superior spring element 47 and inferior anterior spring element 48.2 bear is shown by a dashed line that is anterior and parallel to line 104 indicating the approximate position of the metatarsal-phalangeal joints.

FIG. 128 is a bottom plan view of a spring element 51 generally similar to that shown in a side view in FIG. 49 including a superior spring element 47, an inferior anterior spring element 48.2, and an inferior spring element 50. The anterior spring element 48.2 is affixed by three fasteners 29 to the anterior spacer 55.2 and the superior spring element 47 near the anterior side 33. As shown in FIG. 127, the posteriomost portion of the anterior spacer 55.2 upon which the superior spring element 47 and inferior anterior spring element 48.2 bear is shown by a dashed line that converges towards line 104 on the medial side 35.

FIG. 129 is a bottom plan view of a spring element 51 generally similar to that shown in a side view in FIG. 49 including a superior spring element 47, an inferior anterior spring element 48.2, and an inferior spring element 50. The inferior anterior spring element 48.2 is affixed by three fasteners 29 to the anterior spacer 55.2 and the superior spring element 47 near the anterior side 33. As shown in FIG. 127, the posteriomost portion of the anterior spacer 55.2 upon which the superior spring element 47 and inferior anterior spring element 48.2 bear is shown by a dashed line

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that converges towards line 104 on the medial side 35 more dramatically than the spring element 51 embodiment shown in FIG. 128.

FIG. 130 is a bottom plan view of a spring element 51 generally similar to that shown in a side view in FIG. 49 including a superior spring element 47, an inferior anterior spring element 48.2, and an inferior spring element 50. The inferior anterior spring element 48.2 is affixed by one fastener 29 directly to the superior spring element 47 near the anterior side 33.

FIG. 131 is a bottom plan view of a spring element 51 generally similar to that shown in a side view in FIG. 49 including a superior spring element 47, an inferior anterior spring element 48.2, and an inferior spring element 50. The inferior anterior spring element 48.2 is affixed by one fastener 29 directly to the superior spring element 47 near the anterior side 33. However, the inferior anterior spring element 48.2 has less overall anterior to posterior length, and in particular, less area posterior of line 104 than the embodiment shown in FIG. 130.

FIG. 132 is a bottom plan view of a spring element 51 including a superior spring element 47, and an inferior spring element 50 having a U-shape. The inferior spring element 50 can be affixed to the superior spring element 47 with two fasteners and includes a notch 71 that can extend to various lengths in the middle portion 105 thereby imparting to the inferior spring element 50 a U-shape.

FIG. 133 is a bottom plan view of a spring element 51 including a superior spring element 47, and an inferior spring element 50 having a J-shape. The inferior spring element 50 can be affixed to the superior spring element 47 with two fasteners and includes a notch 71 that can extend to various lengths in the middle portion 105 thereby imparting to the inferior spring element 50 a J-shape.

FIG. 134 is a bottom plan view of a spring element 51 including a superior spring element 47 and an inferior spring element 50 including portions having a gently curved convex shape. The inferior spring element 50 can be curved upwards about a portion of the medial side 35, lateral side 36, and posterior side 34. This can increase the exhibited stiffness of the inferior spring element 50 about the sides in these areas. As result, the generally planar middle portion 105 of the inferior spring element 50 in the area anterior of the flexural axis 59 can assume most of the work associated with flexion and torsion. In some applications, the use of a curved convex structure or other method of increasing the stiffness of a specific portion of a spring element 51 can possibly be used to enhance the stability and performance of an article of footwear.

FIG. 135 is a cross-sectional view of the spring element 51 shown in FIG. 134 taken along line 135—135 showing a superior spring element 47 having a gently curved convex shape so as to better accommodate the shape of a wearer's heel, and an inferior spring element 50 having a similar convex shape including an outsole 43 affixed thereto.

FIG. 136 is a cross-sectional view of an alternate spring element 51 taken at a position similar to that shown in FIG. 134. Again, the superior spring element 47 has a gently curved convex shape that can better accommodate the shape of a wearer's heel. However, the inferior spring element 50 has a camilever shape including a concavity 76 in the middle portion 105. The middle portion 105 of the inferior spring element 50 is generally planar and can lie flat against a portion of the superior spring element 47 when the two components are affixed together. However, a portion of the medial side 35, lateral side 36, and posterior side 34 of the inferior spring element 50 descends from the middle portion

105 to form a curved cantilever shape. Further, the inferior spring element 50 is curved slightly upwards at the edges about the medial side 35, lateral side 36, and posterior side 34. The possible introduction of curvature at the edges of an inferior spring element 50 can also be used to effect the exhibited flexural and torsional stiffness of the component, as desired. As shown, an outsole 43 can be affixed to the curved edge portions of the inferior spring element 50.

FIG. 137 is a side view of a spring element 51 consisting of a superior spring element 47 including toe spring in the forefoot area 58 and an inferior spring element 50 including a compound curved shape forming a concavity 76 in the midfoot area 67.

FIG. 138 is a side view of a spring element 51 consisting of a superior spring element 47 that is relatively flat in the forefoot area 58 and an inferior spring element 50 including a compound curved shape forming a concavity 76 in the midfoot area 67.

FIG. 139 is a side view of a spring element 51 having a flexural axis 59 in the forefoot area 58 consisting of a superior spring element 47 including toe spring and an inferior spring element 50 including a relatively flat shape.

FIG. 140 is a side view of a spring element 51 having a flexural axis 59 in the forefoot area 58 consisting of a superior spring element 47 having a relatively flat shape and also an inferior spring element 50 including a relatively flat shape.

FIG. 141 is a side view of a spring element 51 having a flexural axis 59 in the forefoot area 67 consisting of a superior spring element 47 made in continuity with an inferior spring element 50 forming an elliptical shape on the posterior side 34.

FIG. 142 is a side view of a spring element 51 having a flexural axis 59 in the midfoot area 67 consisting of a superior spring element 47 formed in continuity with an inferior spring element 50 forming an upwardly rounded shape on the posterior side 34.

FIG. 143 is a side view of a spring element 51 having a flexural axis 59 in the midfoot area 67 consisting of a superior spring element 47 formed in continuity with an inferior spring element 50 forming a downwardly rounded shape on the posterior side 34.

FIG. 144 is a side view of a spring element 51 having a flexural axis 59 and a concavity 76 in the midfoot area 67 consisting of a superior spring element 47 formed in continuity with an inferior spring element 50 forming an elliptical shape on the posterior side 34.

FIG. 145 is a side view of a spring element 51 consisting of a superior spring element 47, a posterior spacer 42, and an inferior spring element 50 having a relatively flat shape. As shown, a posterior spacer 42 can provide a substantial elevation in the rearfoot area 68.

FIG. 146 is a side view of a spring element 51 consisting of a superior spring element 47, a posterior spacer 42, and an inferior spring element 50 having an upwardly curved shape at the posterior side 34. As shown, a posterior spacer 42 can provide a substantial elevation in the rearfoot area 68.

FIG. 147 is a side view of a spring element 51 consisting of a superior spring element 47, a posterior spacer 42, and an inferior spring element 50 having a complex curved shape at the posterior side 34. As shown, a posterior spacer 42 can provide a substantial elevation in the rearfoot area 68.

FIG. 148 is a side view of a spring element 51 consisting of a superior spring element 47, a posterior spacer 42, and an inferior spring element 50 having an arcuate shape. As shown, a posterior spacer 42 can provide a substantial elevation in the rearfoot area 68.

FIG. 149 is a side view of a spring element 51 consisting of a superior spring element 47, a posterior spacer 42, and an inferior spring element 50 that is orientated downward along the posterior spacer 42, but which is relatively flat near the posterior side 34. As shown, a posterior spacer 42 can provide a substantial elevation in the rearfoot area 68.

FIG. 150 is a side view of a spring element 51 consisting of a superior spring element 47 made in continuity with an inferior spring element 50 forming an elliptical shape on the posterior side 34. As shown, the anterior portion of the inferior spring element 50 is affixed to a posterior spacer 42 which can provide substantial elevation in the rearfoot area 68. Alternately, an inferior spring element 50 can be made as a separate part, and can then be affixed to a posterior spacer 42 and/or superior spring element 47 near the anterior end of the inferior spring element 50, and also be affixed to the superior spring element 47 near the posterior end of the inferior spring element 50.

While it is generally preferred or advantageous that the inferior spring element 50 and flexural axis 59 be positioned in the midfoot area 67 or rearfoot area 68, it is possible for the inferior spring element 50 to extend into the anterior portion of the midfoot area 67 and forefoot area 58, as shown in FIGS. 151—154, and the like. FIG. 151 is a bottom plan view of a spring element 51 consisting of a superior spring element 47 and an inferior spring element 50. Line 104 indicates the approximate position of a wearer's metatarsal-phalangeal joints relative to the superior spring element 47. Again, on the medial side 35 the metatarsal-phalangeal joints are commonly found at slightly less than 70 percent of foot length and on the lateral side 36 greater than 60 percent of foot length, but yet somewhat less than on the medial side 35, that is, as measured from the posterior side 34 of an article of footwear 22. FIG. 151 illustrates the possibility of the flexural axis 59 being generally consistent with line 104.

FIG. 152 is a bottom plan view of a spring element 51 consisting of a superior spring element 47 and an inferior spring element 50. Line 104 indicates the approximate position of a wearer's metatarsal-phalangeal joints relative to the superior spring element 47. FIG. 152 illustrates the possibility of the flexural axis 59 being posterior and generally parallel to line 104.

FIG. 153 is a bottom plan view of a spring element 51 consisting of a superior spring element 47 and an inferior spring element 50. Line 104 indicates the approximate position of a wearer's metatarsal-phalangeal joints relative to the superior spring element 47. FIG. 153 illustrates the possibility of the flexural axis 59 being posterior and generally parallel to line 104 on the medial side 35, but then curved posteriorly away from line 104 on the lateral side 36.

FIG. 154 is a bottom plan view of a spring element 51 consisting of a superior spring element 47 and an inferior spring element 50. Line 104 indicates the approximate position of a wearer's metatarsal-phalangeal joints relative to the superior spring element 47. FIG. 154 illustrates the possibility of the flexural axis 59 being posterior and curved posteriorly away from line 104 on the medial side 35 and lateral side 36.

FIG. 155 is a top plan view of a spring element 51 which can consist solely of a superior spring element 47, or alternately, a superior spring element 47 can serve as a sub-component of a more complex spring element 51, such as one that could further include an inferior spring element 50. Further, a spring element 51 can extend substantially the entire length of an article of footwear 22, thus in the forefoot area 58, midfoot area 67, and rearfoot area 68, or alternately, in only a portion of the length of an article of footwear 22.

In this regard, a spring element 51 can be positioned in solely the rearfoot area 68, or alternately the rearfoot area 68 and midfoot area 67, or alternately solely in the forefoot area 58, or alternately the forefoot area 58 and midfoot area 67. Also shown in FIG. 155 are three primary characteristic last shapes corresponding to the insole net, top net, or bottom net associated with a given last or configuration of an article of footwear 22. In this regard, on the medial side 35 is shown a line corresponding to straight last 108, semi-curved last 106, and curved last 107 configurations. A semi-curved last 106 shape is used in most of the drawing figures herein, but it can be readily understood that a more curved last 107 or straight last 108 configuration can be used in any or all of the embodiments. It can be readily understood that the teachings regarding possible alternate embodiments, structure, and function contained in this paragraph can also be applied to many of the other embodiments shown in the drawing figures of this patent application, and in particular to FIGS. 155-220, but for the sake of brevity the relevant discussion contained in this paragraph will not be repeated in association with each embodiment and drawing figure.

FIG. 156 is a top plan view of a spring element 51 that includes a notch 71 on the lateral side 36 posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104. The inclusion of a notch 71 can reduce the flexural modulus or stiffness in bending exhibited along the longitudinal axis 59, but also the torsional stiffness exhibited as between the forefoot area 58, and both the midfoot area 67 and rearfoot area 68. The inclusion of a notch 71 can also create a potential or actual generally transverse line of flexion 54 as between the medial side 35 and the lateral side 36 of the spring element 51.

At higher walking or running speeds, or when jumping, it is known that individuals often impart higher forces on the medial side 35 of the forefoot 58 to greater degree than the lateral side 36, and there can then sometimes be a need, and it can be advantageous to provide greater stiffness on the medial side 35 of the forefoot area 58. Further, given the biomechanical events associated with walking and running, it can be advantageous to reduce the torsional stiffness exhibited on the lateral side 36 of the forefoot area 58 relative to the medial side 35, as this can reduce the length of the effective lever arm formed by the spring element 51 and sole 32 of an article of footwear 22, thereby reduce the rate and magnitude of inward rotation of the foot and so enhance stability and performance. In addition, reducing the torsional stiffness exhibited on the lateral side 36 of the forefoot area 58 can increase the amount of deflection which takes place during impact and the ground support phase of the gait cycle, thus enhance perceived and actual cushioning effects. Moreover, the transition and work performed by the foot during the ground support phase can then be smoother and more economical, but also more natural or comfortable for a wearer. It can be readily understood that this description of biomechanical events and advantageous function could apply to many of the embodiments recited in the specification and shown in the drawing figures of this patent application, but for the sake of brevity the discussion contained in this paragraph will not be repeated in association with each embodiment and drawing figure.

FIG. 157 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 posterior and a second notch 71 anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104. The inclusion of notches 71 can reduce the flexural modulus or stiffness in bending exhibited along the longitudinal axis 59, and in particular, in the area

between both notches 71. Further, the inclusion of notches 71 can also reduce the torsional stiffness exhibited in the area between both notches 71, and also as between the forefoot area 58, and both the midfoot area 67 and rearfoot area 68. The inclusion of notches 71 can also create at least one potential or actual generally transverse line of flexion 54 as between the medial side 35 and the lateral side 36 of the spring element 51, but also at least one potential or actual generally longitudinal line of flexion 54 as between adjacent notches 71 located on the same side.

FIG. 158 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 posterior and a second notch 71 anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104. Further, the spring element 51 includes one notch 71 on the medial side 35 that is generally transverse and opposing the anteriormost notch 71 on the lateral side 36.

Again, the inclusion of notches 71 can reduce the flexural modulus or stiffness in bending exhibited along the longitudinal axis 59, and in particular, in the area between both notches 71. Further, the inclusion of notches 71 can also reduce the torsional stiffness exhibited in the area between both notches 71, and also as between the forefoot area 58, and both the midfoot area 67 and rearfoot area 68. The inclusion of notches 71 can also create at least one potential or actual generally transverse line of flexion 54 as between the medial side 35 and the lateral side 36 of the spring element 51, but also at least one potential or actual generally longitudinal line of flexion 54 as between adjacent notches 71 located on the same side. It can be readily understood that this description of function could apply to many of the embodiments recited in the specification and shown in the drawing figures of this patent application, but for the sake of brevity the discussion contained in this paragraph will not be repeated in association with each embodiment and drawing figure.

FIG. 159 is a top plan view of a spring element 51 that is configured in a shape consistent with a straight last 108 and includes two notches 71 on the lateral side 36 that extend over half the distance from the lateral side 36 to the longitudinal axis 59, one being located posterior and another anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104.

FIG. 160 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 being located posterior and a second notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and also an opening 72 in the form of a longitudinal slit 82 located therethrough.

FIG. 161 is a top plan view of a spring element 51 that includes a notch 71 on the lateral side 36 being located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and another notch 71 extending from near the anterior side 33 and forming a longitudinal slit 82.

FIG. 162 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 being located posterior and a second notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and another notch 71 extending from near the anterior side 33 and forming a longitudinal slit 82.

FIG. 163 is a top plan view of a spring element 51 that includes one notch 71 on the lateral side 36 located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104.

langeal joints indicated by line 104, and also an opposing notch 71 on the medial side 35.

FIG. 164 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being along, and a third notch 71 being anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and also three opposing notches 71 on the medial side 35.

FIG. 165 is a top plan view of a spring element 51 that includes one notch 71 on the lateral side 36 located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2.

FIG. 166 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being along, and a third notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104.

FIG. 167 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being along, and a third notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 on the medial side 35 opposing the posteriomost notch 71 on the lateral side 36.

FIG. 168 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being along, and a third notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 on the medial side 35 opposing the posteriomost notch 71 on the lateral side 36, and another notch 71 on the medial side 35 opposing the anteriomost notch 71 on the lateral side 36.

FIG. 169 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being along, and a third notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 on the medial side 35 opposing the posteriomost notch 71 on the lateral side 36, and another notch 71 on the medial side 35 opposing the anteriomost notch 71 on the lateral side 36.

FIG. 170 is a top plan view of a spring element 51 that includes four notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being along, and third and fourth notches 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 on the medial side 35 opposing the posteriomost notch 71 on the lateral side 36.

FIG. 171 is a top plan view of a spring element 51 that includes four notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being located along, and a third and fourth notch 71 being located anterior

of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 on the medial side 35 opposing the posteriomost notch 71 on the lateral side 36.

FIG. 172 is a top plan view of a spring element 51 that includes four notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being located along, and a third and fourth notch 71 being located anterior

of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a first notch 71 on the medial side 35 opposing the posteriomost notch 71 on the lateral side 36, a second notch 71 on the medial side 35 consistent with the position of line 104, and a third notch 71 on the medial side 35 opposing the anteriomost notch 71 on the lateral side 36.

FIG. 173 is a top plan view of a spring element 51 that includes four notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being located along, and a third and fourth notch 71 being located anterior

of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and four notches 71 on the medial side 35 opposing those on the lateral side 36.

FIG. 174 is a top plan view of a spring element 51 having the shape of a curved last 107 and a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2.

FIG. 175 is a top plan view of a spring element 51 having the shape of a semi-curved last 106 and a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 that nearly extends to line 104 thereby defining two fingers 109.1 and 109.2.

FIG. 176 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 located posterior, a second notch 71 located along, and third notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2, and a notch 71 on the medial side 35 opposing the anteriomost notch 71 on the lateral side 36.

FIG. 177 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 located posterior, a second notch 71 located along, and a third notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2, and two notches 71 on the medial side 35, one opposing the anteriomost and another opposing the posteriomost notches 71 on the lateral side 36.

FIG. 178 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 located posterior, a second notch 71 located along, and a third notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2, and three notches 71 on the medial side 35 opposing those on the lateral side 36.

FIG. 179 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 located posterior and a second notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, a notch 71 extending from the anterior side 33 forming a longitudinal slit 82

thereby defining two fingers 109.1 and 109.2, and a notch 71 on the medial side 35 opposing the anteriormost notch 71 on the lateral side 36.

FIG. 180 is a top plan view of a spring element 51 that includes one notch 71 on the lateral side 36 located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and two notches 71 extending from near the anterior side 33 forming two longitudinal slits 82 thereby defining three fingers 109.1, 109.2, and 109.3.

FIG. 181 is a top plan view of a spring element 51 that includes one notch 71 on the lateral side 36 located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and three notches 71 extending from near the anterior side 33 forming three longitudinal slits 82 thereby defining four fingers 109.1, 109.2, 109.3, and 109.4.

FIG. 182 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being located along, and a third notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 on the medial side 35 opposing the anteriormost notch 71 on the lateral side 36.

FIG. 183 is a top plan view of a spring element 51 that includes four notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being located along, and third and fourth notches 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 on the medial side 35 opposing the anteriormost notch 71 on the lateral side 36.

FIG. 184 is a top plan view of a spring element 51 that includes two notches 71 extending from near the anterior side 33 forming two longitudinal slits 82 thereby defining three fingers 109.1, 109.2, and 109.3.

FIG. 185 is a top plan view of a spring element 51 that includes three notches 71 extending from near the anterior side 33 forming three longitudinal slit 82 thereby defining four fingers 109.1, 109.2, 109.3, and 109.4.

FIG. 186 is a top plan view of a spring element 51 that includes one notch 71 on the lateral side 36 located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, an opposing notch 71 on the medial side 35, and two notches 71 extending from near the anterior side 33 forming two longitudinal slits 82 thereby defining three fingers 109.1, 109.2, and 109.3.

FIG. 187 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 being located posterior and a second notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and two opposing notches 71 on the lateral side 36.

FIG. 188 is a top plan view of a spring element 51 that includes one notch 71 on the lateral side 36 located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2, and a notch 71 on the medial side 35 opposing the notch 71 on the lateral side 36.

FIG. 189 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 being located posterior and a second notch 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, a notch 71

71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2, and two notches 71 on the medial side 35 opposing the two notches 71 on the lateral side 36.

FIG. 190 is a top plan view of a spring element 51 that includes one notch 71 on the lateral side 36 located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, an opposing notch 71 on the medial side 35, and three notches 71 extending from near the anterior side 33 forming three longitudinal slits 82 thereby defining four fingers 109.1, 109.2, 109.3, and 109.4.

FIG. 191 is a top plan view of a spring element 51 that includes four notches 71 on the lateral side 36, a first notch 71 being located posterior, a second notch 71 being located along, and third and fourth notches 71 being located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and four notches 71 on the medial side 35 opposing those on the lateral side 36, and a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2.

FIG. 192 is a top plan view of a spring element 51 that includes a notch 71 on the medial side 35 being located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and the notch 71 then extends laterally and anteriorly towards the anterior side 33 forming a longitudinal slit 82.

FIG. 193 is a top plan view of a spring element 51 that includes a notch 71 on the lateral side 36 being located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and the notch 71 then extends medially and anteriorly towards the anterior side 33 forming a longitudinal slit 82 and a relatively wide opening 82 in the forefoot area 58.

FIG. 194 is a top plan view of a spring element 51 that includes a relatively wide opening 82 in the forefoot area 58.

FIG. 195 is a top plan view of a spring element 51 that includes a relatively wide first opening 82 in the forefoot area 58, and a relatively wide second opening 82 in the rearfoot area 68.

FIG. 196 is a top plan view of a spring element 51 that includes a relatively wide opening 82 extending between the forefoot area 58, midfoot area 67, and rearfoot area 68.

FIG. 197 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 extending substantially within the midfoot area 67 and located posterior of line 104, a second notch 71 located along line 104, and a third notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2.

FIG. 198 is a top plan view of a spring element 51 that includes three notches 71 on the lateral side 36, a first notch 71 located posterior of line 104 and extending substantially within the midfoot area 67 and also longitudinally within the rearfoot area 68 thereby imparting a J shape to the spring element 51, a second notch 71 located along line 104, and a third notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2.

FIG. 199 is a top plan view of a spring element 51 that includes two notches 71 on the lateral side 36, a first notch 71 located posterior of line 104, a second notch 71 located anterior of the approximate position of a wearer's metatarsal-

sal-phalangeal joints indicated by line 104, a notch 71 extending from the anterior side 33 forming a longitudinal slit 82 thereby defining two fingers 109.1 and 109.2, and a relatively wide notch 71 on the medial side 35 extending substantially within the midfoot area 67 and also longitudinally within the rearfoot area 68 thereby imparting a reverse J shape to the spring element 51.

FIG. 200 is a top plan view of a spring element 51 that includes a notch 71 on the lateral side 36 being located posterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104, and the notch 71 then extends medially and anteriorly towards the anterior side 33 forming a longitudinal slit 82.

FIG. 201 is a top plan view of a spring element 51 that includes a first notch 71 located posterior and a second notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104 on the lateral side 36, and also two generally opposing notches 71 on the medial side 35, and two notches 71 extending from the anterior side 33 forming two longitudinal slits 82 thereby defining three fingers 109.1, 109.2, and 109.3. As shown in FIG. 201, the three fingers 109 which are present narrow at their anterior ends, and generally resemble those of a bird or reptile.

FIG. 202 is a top plan view of a spring element 51 that includes a first notch 71 located posterior and a second notch 71 located anterior of the approximate position of a wearer's metatarsal-phalangeal joints indicated by line 104 on the lateral side 36, and also two generally opposing notches 71 on the medial side 35, and three notches 71 extending from the anterior side 33 forming three longitudinal slit 82 thereby defining four fingers 109.1, 109.2, 109.3, and 109.4. As shown in FIG. 201, the four fingers 109 which are present narrow at their anterior ends, and generally resemble those of a bird or reptile.

FIG. 203 is a top plan view of a spring element 51 that includes a removable lateral anterior spring element 77 and medial anterior spring element 78, which are affixed to a posterior spring element 49 by fasteners 29. The medial and lateral spring elements 78 and 77 form fingers 109.1 and 109.2. Unlike the spring element 51 shown in FIG. 37, the posterior spring element 49 of the embodiment shown in FIG. 203 includes a projection 70 shown in dashed phantom lines.

FIG. 204 is a top plan view of a spring element 51 which includes a removable lateral anterior spring element 77 that can be affixed by a fastener 29 to a medial anterior spring element that is formed as a single part with a posterior spring element 49. The medial and lateral spring elements form fingers 109.1 and 109.2 and include notches 71 that can create potential or actual lines of flexion 54 such as along line 104 which corresponds to the approximate position of a wearer's metatarsal-phalangeal joints.

FIG. 205 is a top plan view of a spring element 51 which includes a removable medial anterior spring element 78 that can be affixed by a fastener 29 to a lateral anterior spring element that is formed as a single part with a posterior spring element 49. The medial and lateral spring elements form fingers 109.1 and 109.2 and include notches 71 that can create potential or actual lines of flexion 54 such as along line 104 which corresponds to the approximate position of the metatarsal-phalangeal joints.

FIG. 206 is a top plan view of a spring element 51 which includes a removable lateral anterior spring element 77 that can be affixed by fastener 29 to a medial anterior spring element that is formed as a single part with a posterior spring element 49. The medial and lateral spring elements form

ingers 109.1 and 109.2 and include notches 71 that can create potential or actual lines of flexion 54 such as along line 104 which corresponds to the approximate position of the metatarsal-phalangeal joints.

5 FIG. 207 is a top plan view of a spring element 51 which includes a removable lateral anterior spring element 77 that can be affixed by fasteners 29 to a medial anterior spring element that is formed as a single part with a posterior spring element 49. The medial anterior spring element includes fingers 109.1 and 109.2, and the lateral anterior spring element 77 includes fingers 109.3 and 109.4.

10 FIG. 208 is a top plan view of a spring element 51 which includes removable fingers 109.1, 109.2, 109.3 that can be affixed by fastener 29 to a posterior spring element 49 that includes a projection 70.

15 FIG. 209 is a top plan view of a spring element 51 that includes an anterior spring element 48 that can be affixed by fasteners 29 to a posterior spring element 49 that includes a projection 70. The anterior spring element 48 includes a notch 71 on the lateral side 36 which extends anteriorly and forms a longitudinal slit 82. Accordingly, the anterior side 33 of the anterior spring element 48 is not interrupted by a longitudinal slit 82. This configuration can be advantageous for use in a soccer shoe, since the anterior side 33 can exhibit greater stiffness and better overall performance characteristics when used to kick a soccer ball.

20 FIG. 210 is a top plan view of a spring element 51 which includes an anterior spring element 48 that includes a notch 71 and fingers 109.1, 109.2, 109.3, and is affixed by a fastener 29 to a posterior spring element 49 that includes a projection 70.

25 FIG. 211 is a top plan view of a spring element 51 which includes an anterior spring element 48 that includes notches 71, fingers 109.1, 109.2, 109.3, and is affixed by a fastener 29 to a posterior spring element 49 that includes a projection 70.

30 FIG. 212 is a top plan view of a spring element 51 which includes an anterior spring element 48 that includes notches 71, fingers 109.1, 109.2, 109.3, and a projection 70 that is affixed by a fastener 29 to a posterior spring element 49.

35 FIG. 213 is a top plan view of a spring element 51 which includes an anterior spring element 48 which includes notches 71 that extend from the lateral side 36 nearly to the longitudinal axis 59 and also a projection 70 that is affixed by a fastener 29 to a posterior spring element 49.

40 FIG. 214 is a top plan view of a spring element 51 which includes a medial anterior spring element 78, lateral anterior spring element 77, medial posterior spring element 111 and lateral posterior spring element 112 that are affixed by fasteners 29 to a bracket 110.

45 FIG. 215 is a top plan view of a spring element 51 which includes an anterior spring element 48 including a longitudinal slit 82, which is affixed by fasteners 29 to a posterior spring element 49 that includes notches 71.

FIG. 216 is a top plan view of a spring element 51 which includes a medial anterior spring element 78 and lateral anterior spring element 77 which are affixed by fasteners 29 to a posterior spring element 49 that includes a notch 71.

50 FIG. 217 is a top plan view of a spring element 51 which includes a medial anterior spring element 78 formed in continuity as a single part with a lateral posterior spring element 112, and a lateral anterior spring element 77 formed in continuity as a single part with a medial posterior spring element 111, and these two components are affixed together by a fastener 29 thereby forming an X shape.

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FIG. 218 is a top plan view of a spring element 51 which includes an anterior spring element 48 that is affixed to a posterior spring element by a fastener 29.

FIG. 219 is a top plan view of a spring element 51 which includes an anterior spring element 48 that is affixed to an intermediate anterior spring element 113 by a fastener 29. The intermediate anterior spring element 113 is affixed in turn to a posterior spring element 49 having a protrusion 70 by a fastener 29.

FIG. 220 is a top plan view of a spring element 51 that includes a notch 71 and a plurality of openings 82. The openings 82 can be aligned to create a line of flexion 54, such as along line 104 corresponding to the approximate position of the metatarsal-phalangeal joints, and also for the purpose of ventilation. It can be readily understood that openings can be introduced in other embodiments of a spring element disclosed herein, and like the, for the purpose of enhancing ventilation, dissipating heat, or reducing weight.

FIG. 221 is a longitudinal cross-sectional side view of an article of footwear 22 including a spring element 51 including a superior spring element 47, an anterior spring element 48.2, and an inferior spring element 50. The anterior spring element 48.2 is affixed to the anterior spacer 55.2 and superior spring element 47 with fasteners 29. Also shown are outsole 43 traction members 115 affixed to the anterior spring element 55.2 and the inferior spring element 50. The traction members 115 affixed to the anterior spring element 55.2 can be superimposed over openings 72 in the anterior spring element 55.2, and when a force application is imparted thereto, the traction member 115 can deflect upwards to greater degree and thereby provide enhanced cushioning effects.

FIG. 222 is a cross-sectional view taken along line 222—222 of the inferior spring element 50 shown in FIG. 221. Shown are outsole 43 traction members 115 which can be affixed to the inferior side 38 of the inferior spring element 50, e.g., by conventional adhesive means and including self-adhesive, vulcanization, chemical bonding, mechanical means, and the like.

FIG. 223 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element 50 including outsole 43 traction members 115. The traction members 115 adjacent the medial side 35 and lateral side 36 encompass the respective sides of the inferior spring element 50.

FIG. 224 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element 50 including outsole 43 traction members 115. The traction members 115 adjacent the medial side 35 and lateral side 36 encompass the respective sides of the inferior spring element 50 and have a gently rounded or arcuate configuration.

FIG. 225 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element 50 including outsole 43 traction members 115. A portion of the traction members 115 extend into openings 72 in the inferior spring element 50, and can thereby achieve an enhanced mechanical bond.

FIG. 226 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element 50 including outsole 43 traction members 115. A portion of the traction members 115 including a head 65.1 and a stem 64.1 can extend through openings 72 in the inferior spring element 50, and can thereby achieve a mechanical bond thereto.

FIG. 227 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element

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50 including outsole 43 traction members 115. The traction members 115 can be in communication with one another by a thin web 114, but do not normally extend into the openings 72 in the inferior spring element 50. Accordingly, when a force application is imparted to the traction members 115, they can be caused to deflect into the openings 72 in the inferior spring element 50.

FIG. 228 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element 50 including outsole 43 traction members 115. The traction members 115 are in communication with one another by a thin web 114 and a portion of the web 114 extends into the openings 72 in the inferior spring element 50. Accordingly,

when a force application is imparted to the traction members 115, they can be caused to deflect into the openings 72 in the inferior spring element 50 and a portion of the web 114 then protrude on the superior side 37 of the inferior spring element 50.

FIG. 229 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element 50 including outsole 43 traction members 115. The traction members 115 are in communication with one another by a thin web 114 which extends into the openings 72 in the inferior spring element 50. Accordingly, when a force application is imparted to the traction members 115, they can be caused to deflect into the openings 72 in the inferior spring element 50.

FIG. 230 is a cross-sectional view taken along a line similar to 222—222 of an alternate inferior spring element 50 including outsole 43 traction members 115. The traction members 115 are in communication with one another by a thin web 114 and extend into the openings 72 in the inferior spring element 50. Accordingly, when a force application is imparted to the traction members 115, they can be caused to deflect into the openings 72 in the inferior spring element 50 and a portion of the web 114 can then protrude on the superior side 37 of the inferior spring element 50. Also shown are traction members 50 adjacent the medial side 35 and lateral side 36 which are not bounded on all sides by the inferior spring element 50. As shown, the traction members 115 can have a triangular shape, or other geometric shapes. The asymmetric triangular shape shown in FIG. 230 can cause the traction members 115 to be so biased as to deflect in a desired direction, and this can influence the exhibited traction characteristics of the article of footwear 22.

FIG. 231 is a cross-sectional view taken along a line similar to 222—222 of an inferior spring element 50 similar to that shown in FIG. 228, but also showing the deflection of a traction member 115 relative to an opening 72 in the inferior spring element 50 due to a force application caused by impact with a rock 116 laying upon the ground support surface 117.

FIG. 232 is a bottom plan view of a spring element 51 including an inferior spring element 50 including openings 72 shown with phantom dashed lines and an outsole 43 having a web 114 and traction members 115 made of a resilient elastomeric material. Further, some of the traction members 115 adjacent to the medial side 35 and lateral side 36 are not bounded by the inferior spring element 50, as also shown in FIG. 229.

FIG. 233 is a longitudinal cross-sectional side view of an alternate article of footwear 22 including a spring element 51 including a superior spring element 47, anterior spring

element 48.2, anterior spacer 55.2, inferior spring element 50, posterior fluid-filled bladder 101.1, and an anterior fluid-filled bladder 101.2. As shown, the anterior spring element 48.2 can optionally include openings 72 therethrough which can enhance the deflection of traction members 115. It can be readily understood that the inferior spring element 50 could also include similar openings 72 and related structure with respect to traction members 115.

FIG. 234 is a longitudinal cross-sectional lateral side view of the article of footwear 22 and spring element 51 shown in FIG. 45. Although the flexural axis 59 of the inferior spring element 50 is diagonal with respect to the longitudinal axis 69, the magnitude of downward concavity, slope, curvature, and general configuration of the inferior spring element 50 in the area adjacent to and immediately posterior of the flexural axis 59 is essentially the same on both the medial side 35 and lateral side 36. It can be readily understand that other alternate inferior spring elements 50 could have different configurations, but nevertheless, have similar magnitude of downward concavity, slope, and curvature in the area adjacent to and immediately posterior of the flexural axis 59, that is, on both the medial side 35 and lateral side 36 of each embodiment.

FIG. 235 is a longitudinal cross-sectional lateral side view of the article of footwear 22 and spring element 51 shown in FIG. 49. Again, the inferior spring element 50 could alternately have a flexural axis 59 that is diagonal with respect to the longitudinal axis 69. As also shown in FIG. 129, the anterior spacer 55.2 is positioned anterior the approximate position of the metatarsal-phalangeal joints indicated by line 104. Further, the anterior spacer 55.2 does not extend rearwards or posteriorly so far on the lateral side 36 as on the medial side 35. Other possible configurations of anterior spacer 55.2 are also shown in FIGS. 127-128.

FIG. 236 is a bottom plan view of an article of footwear 22 having the outsole 43 broken away or removed to show a midsole 26 in the rearfoot area 68 on the medial side 35. The spring element 51 includes a superior spring element 47, and an inferior spring element 50. As shown with a dashed phantom line, the superior spring element 47 is substantially located within the midfoot area 67 and rearfoot area 68. The inferior spring element 50 is located on the lateral side 36.

FIG. 237 is a bottom plan view of an article of footwear 22 having the outsole 43 broken away or removed to show a midsole 26 in the rearfoot area 68 on the medial side 35. The spring element 51 consists of an inferior spring element 50, and a superior spring element 47 including a posterior spring element 49 and an anterior spring element 48. The inferior spring element 50 extends slightly beyond the longitudinal axis 69, thus into a portion the medial side 35.

FIG. 238 is a bottom plan view of an article of footwear 22 having the outsole 43 broken away or removed to show a midsole 26 in the rearfoot area 68 on the medial side 35. The spring element 51 includes a superior spring element 47 which extends substantially full length, and an inferior spring element 50. The inferior spring element 50 extends slightly more anteriorly and also further beyond the longitudinal axis 69 and towards the medial side 35 than the embodiment shown in FIG. 237.

FIG. 239 is a bottom plan view of an article of footwear 22 having the outsole 43 broken away or removed to show a midsole 26 in the rearfoot area 68 on the medial side 35. The spring element 51 includes a superior spring element 47, and an inferior spring element 50. The superior spring element 47 includes two notches 71 on the lateral side 36, and a notch 71 on the medial side 35 that extends laterally and anteriorly

to form a longitudinal slit 82. The inferior spring element 50 also projects slightly towards the medial side 35 near the posterior side 34.

FIG. 240 is a bottom plan view of an article of footwear

- 5 22 having the outsole 43 broken away or removed to show a midsole 26 in the rearfoot area 68 on the medial side 35. The spring element 51 includes a superior spring element 47, and an inferior spring element 50. The superior spring element 47 includes two notches 71 on the lateral side 36, and the more posterior notch 71 extends medially and anteriorly to form a longitudinal slit 82. The inferior spring element 50 projects more substantially towards the medial side 35 near the posterior side 34 than in the embodiment shown in FIG. 239.

- 15 FIG. 241 is a bottom plan view of an article of footwear

- 22 having an outsole 43 and including a midsole 26 in the rearfoot area 68 on the medial side 35. The spring element 51 includes a superior spring element 47, and an inferior spring element 50. The superior spring element 47 is shown with a dashed phantom line and includes one notch 71 on the lateral side 36, and another notch 71 on the medial side 35 consistent with line 104 indicating the approximate position of the metatarsal-phalangeal joints. The inferior spring element 50 also projects slightly towards the medial side 35 near the posterior side 34. The fastener 29 for affixing the inferior spring element 50 is not visible from the bottom side, thus is shown with a dashed phantom line.

- 20 FIG. 242 is a cross-sectional view taken along line 242—242 of the article of footwear 22 shown in FIG. 241.

- 25 As shown, the superior spring element 47 is positioned under the insole 31 and inside the shoe upper 23.

- 30 FIG. 243 is a cross-sectional view taken along a line similar to 242—242 shown in FIG. 241 showing an alternate article of footwear 22 and construction relative to that shown in FIG. 242. As shown, the superior spring element 47 is positioned externally with respect to the shoe upper 23, and also extends about the medial side 35 and lateral side 36 of the shoe upper 22 providing a heel counter 24.

- 35 FIG. 244 is a cross-sectional view taken along a line similar to 242—242 shown in FIG. 241 showing an alternate article of footwear 22 and construction relative to that shown in FIG. 242. As shown, the superior spring element 47 is positioned externally with respect to the shoe upper 23 and is partially covered by the midsole 26 on the medial side 35, but is exposed and partially visible on the lateral side 36.

- 40 FIG. 245 is a cross-sectional view taken along a line similar to 242—242 shown in FIG. 241 showing an alternate article of footwear 22 and construction relative to that shown in FIG. 242. As shown, the superior spring element 47 is positioned externally with respect to the shoe upper 23 and can be completely or partially covered by the midsole 26. The superior spring element can be exposed on the medial side 35 as shown, or alternately be exposed on the lateral side 36, anterior side 33, or posterior side 34. Further, the superior spring element 47 can be permanently affixed in place relative to the midsole 26, or alternately, can be removed from the midsole 26 and be replaced, that is, the superior spring element 47 can optionally be removed from the space or opening 72 in the midsole 26 in which it is located.

- 45 FIG. 246 is a bottom plan view of an article of footwear 22 including a midsole 26 on the medial side 35, and also a spring element 51 including a superior spring element 47 and an inferior spring element 50. The inferior spring element 50 is located on the lateral side 36 of the rearfoot area 68, and is integral with an anterior spring element 48.3 located on the lateral side 36 in the forefoot area 58.

FIG. 247 is a bottom plan view of an article of footwear 22 including a spring element 51 including a superior spring element 47, and an inferior spring element 50. The inferior spring element 50 is located in the rearfoot area 68, and is integral with an anterior spring element 48.3 located in the forefoot area 58.

FIG. 248 is a bottom plan view of an article of footwear 22 including a spring element 51 including a superior spring element 47, and an inferior spring element 50. The inferior spring element 50 is located in the rearfoot area 68, and includes a notch 71 on the lateral side 36 in the midfoot area 67, and is integral with an anterior spring element 48.3 located in the forefoot area 58.

FIG. 249 is a longitudinal cross-sectional lateral side view of the embodiment shown in FIG. 248 showing an article of footwear 22 including a spring element 51 including a superior spring element 47, and an inferior spring element 50. The inferior spring element 50 is located in the rearfoot area 68 and is integral with an anterior spring element 48.3 that is located in the forefoot area 58.

FIG. 250 is a flow diagram regarding a method of conducting business including making and delivering a custom article of footwear.

FIG. 251 is a flow diagram regarding a method of conducting business including making and delivering footwear components sufficient for making a custom article of footwear.

FIG. 252 is a flow diagram regarding a method of conducting business including making and delivering at least one footwear component for use in making a custom article of footwear.

FIG. 253 is a flow diagram regarding a method of conducting business with the use of a vending device for making and delivering at least one footwear component for use in making a custom article of footwear.

The collecting of data step a shown in FIGS. 250-253 could be done at a retail store or other point of purchase or service location by spoken word and direct observation and measurement by a wearer possibly interacting with a retail employee or other service provider. Alternately, the collecting of data could be done by spoken word or key selection over the telephone, or by written word such as letter, Fax, e-mail, the use of a computer possibly including a keyboard, a touch screen, voice recognition capability, or other data storage and retrieval system, or other methods of transmitting data and information such as with the use of two or three dimensional scanners or imaging devices, photos, video, or other tangible mediums of expression. The collecting step a could include collecting data relating to a consumer or individual, e.g., such as, their name, mailing address, age, sex, telephone number, e-mail address, identification number, password, desired method of payment, desired method of delivery, but also data relating to their weight, length and width foot size, arch characteristics, selected athletic activity, performance level, and also preferences with respect to a custom article of footwear and components thereof. It can be readily understood that a consumer can order and purchase a custom article of footwear for a third party, e.g., a consumer who is a parent may place a footwear order and make a purchase for another individual such as a family member.

The creating of information and intelligence step b can include, e.g., determining for an individual, consumer, or wearer a suitable footwear length and width size, a suitable footwear last or other three dimensional footwear model or shape, providing a selection of footwear category types and a selection of different styles of a custom article of footwear

or at least one component thereof, determining and providing a finite set of combinations and permutations of a plurality of footwear components and a plurality of variations of a plurality of these components for making a custom article of footwear, determining present inventory and location thereof, causing new inventory to be created, and determining the most efficient and cost effective location from which to distribute and deliver a custom article of footwear or at least one component thereof.

10 The providing a selection of a plurality of footwear components, and a plurality of variations of a plurality of the components step c can include providing a plurality of footwear product categories, and a plurality of possible footwear models or skus, and a further plurality of colors, materials, and footwear components relating to the plurality of footwear models or skus. Accordingly, step c can include creating and providing a plurality of virtual custom articles of footwear derived from a database in a computer environment or creating and providing different actual custom articles of footwear and related components to a consumer, individual, or wearer.

The selecting step d can include selecting a plurality of sufficient footwear components to make a custom article of footwear as shown in FIGS. 250 and 251, or alternatively, as when selecting replacement parts for a custom article of footwear, selecting at least one select footwear component for making a custom article of footwear as shown in FIGS. 252 and 253.

Step e pertains to the providing of information and intelligence further including that relating to the selections made in the selecting step d, and accordingly, can include the possibility of a retail store or employee thereof providing the information and intelligence to their own location, or alternately, to a different remote location. In FIG. 250, step e 35 entails providing information and intelligence to a physical location at which the custom article of footwear can be made, whereas in FIGS. 251 step e entails providing information and intelligence to a physical location from which the sufficient footwear components for making a custom article of footwear can be distributed. In FIGS. 252 and 253, step e entails providing information and intelligence to a physical location from which at least one select footwear component for use in making a custom article of footwear can be distributed. Generally, step e can include the possibility 45 of the information and intelligence being sent to a factory, a vendor, a warehouse and distribution center, a retail store, a medical facility, a service center, a sales office, a mail or delivery courier service, a corporate headquarters, and a consumer or individual for which the footwear product is intended, whether in complete or partial combination.

In FIG. 250, step f can include the possibility of an employee at a retail store, factory, warehouse and distribution center, medical facility, service center, sales office, corporate headquarters, or alternately, a consumer or third party individual assembling and completing the making a custom article of footwear, and then in step g the custom article of footwear is caused to be delivered to a designated address. In a retail store or setting, step g could entail a retail employee completing the making of a custom article of footwear and then delivering the custom article of footwear directly by hand or other method to a consumer or individual. When the consumer or individual is making their selections and placing an order from a remote location such as their home, step g could include the delivery of a custom article of footwear by mail, courier, or express mail courier service such as UPS or FEDEX within a selected number of hours or days.

In FIG. 251, step f entails causing sufficient footwear components to be delivered to a designated address, whereby the assembly for making of a custom article of footwear is thereafter completed by removably securing a plurality of the sufficient footwear components. The designated address could include a factory, a vendor, a warehouse and distribution center, a retail store, a medical facility, a service center, a sales office, a corporate headquarters, a mail or delivery courier service, and a consumer or individual for which the footwear product is intended, whether in complete or partial combination. In a retail store or setting, the delivery of sufficient footwear components could be made directly by hand or other method of delivery to a consumer or individual by a retail employee. When the consumer or individual is making their selections and placing an order from a remote location such as their home, step f could include the delivery of a custom article of footwear by mail, courier, or express mail courier service such as UPS or FEDEX within a selected number of hours or days. The consumer or individual could then complete the assembly for making the custom article of footwear by removably securing a plurality of the sufficient footwear components.

In FIG. 252, step f entails causing at least one footwear component to be delivered to a designated address, whereby the assembly for making of a custom article of footwear is thereafter completed by removably securing the at least one footwear component. The designated address could include a factory, a vendor, a warehouse and distribution center, a retail store, a medical facility, a service center, a sales office, a corporate headquarters, a mail or delivery courier service, and a consumer or individual for which the footwear product is intended, whether in complete or partial combination. In a retail store or setting, the delivery of the at least one footwear component could be made directly by hand or other method of delivery to a consumer or individual by a retail employee. When the consumer or individual is making their selections and placing an order from a remote location such as their home, step f could include the delivery of the at least one footwear component by mail, courier, or express mail courier service such as UPS or FEDEX within a selected number of hours or days. The consumer or individual could then complete the assembly for making the custom article of footwear by removably securing the at least one footwear component.

FIG. 253 relates to the use of a vending device for making and delivering at least one footwear component for use in making a custom article of footwear. The vending device could consist of a vending machine. Alternately, the vending device could include a keyboard or touch screen associated with a computer or other data storage and retrieval system that includes or is linked with an inventory control system and also a substantially automated footwear component delivery system. Accordingly, in a shopping mall, retail store, or some other remote location, a consumer or individual could, e.g., input data, search, select, and complete a transaction to purchase at least one footwear component, or an entire custom article of footwear, if desired, with the use of a vending device.

FIG. 254 is a bottom view of an article of footwear 22 showing a plurality of traction members 115 associated with the sole 32 and outsole 43 extending through a plurality of openings 72 positioned between bridges 97 present in the inferior side 38 of the upper 23. The traction members 115 can be permanently or selectively and removably affixed to a lasting board 79 or spring element 51. The traction members 115 can extend through a plurality of openings in the forefoot area 58, midfoot area 67, rearfoot area 68, and

partial or complete combinations thereof. Also shown by dashed lines is the approximate position of a strap 118 for the upper 23 including closure means 120 such as openings 72 and eyestays 139 for the passage of laces 121, or other mechanical engagement means such as VELCRO® hook and pile.

FIG. 255 is an internal longitudinal cross-sectional lateral side view of the article of footwear 22 shown in FIG. 254 showing a spring element 51 including traction members 115 extending through openings 72 in the upper 23, and a removable strap 118 which is substantially positioned inside the upper 23. The strap 118 can include openings for the passage of traction members 115 therethrough, or alternately, can include traction members which can be caused to pass through openings in the inferior side 38 of the upper 23. The strap 118 also includes closure means 120 such as openings 72 and eyestays 139 for receiving laces 121, or other mechanical engagement means such as VELCRO® hook and pile. As shown, portions of the strap 118 can extend through one or more openings 72 in the side or vamp 52 of the upper 23. As shown, the upper 23 includes a conventional U or V shaped opening on the superior side 37. However, as shown in FIG. 283, the upper 23 could alternately be substantially closed on the superior side 37 in the manner of the so-called "Huaraache" style shoe upper as commercialized by Nike, Inc., e.g., in the HUARAACHE®, MOWABB®, and more recently, the PRESTO®. Alternately, as shown in FIG. 284, portions of the strap 118 can remain substantially within the upper 23, but can be exposed or otherwise accessible on the superior side 37 of the upper 23. The strap 118 can possibly be at least partially maintained in position relative to the upper 23 using a retainer 123.

FIG. 256 is a medial side view of an article of footwear 22 with parts broken away showing a spring element 51 including traction members 115 extending through openings 72 in the upper 23, and a removable strap 118 or quarter(s) 119 substantially positioned outside of the upper 23. The removable strap 118 or quarter(s) 119 includes closure means 120 such as openings 72 and eyestays 139 for the passage of laces 121, or other mechanical engagement means such as VELCRO® hook and pile, and can be affixed in position by at least one fastener 29 which can also possibly be used to simultaneously affix the inferior spring element 50 to the superior spring element 47. The removable strap 118 or quarter(s) 119 can also include at least one traction member 115 and portion of the sole 32 or outsole 43. When the removable strap 118 or quarter(s) 119 is made from a thermoplastic or thermoset material a portion of the sole 32 or outsole 43 can be easily directed bonded or adhered thereto.

FIG. 257 is a bottom view of the article of footwear 22 shown in FIG. 256 showing a plurality of traction members 115 extending through openings 72 in the upper 23, and a removable strap 118 or quarters 119 which is substantially positioned outside the upper 23. As shown, the strap 118 or quarters 119 can include at least one middle outsole element 45, and closure means 120 such as openings 72 and eyestays 139 for the passage of laces 121, or other mechanical engagement means such as VELCRO® hook and pile. The strap 118 or quarters 119 can be affixed in position by at least one fastener 29 which can also possibly be used to simultaneously affix the inferior spring element 50 to the superior spring element 47.

FIG. 258 is a bottom view of an article of footwear 22 showing a plurality of traction members 115 extending through openings 72 in the upper 23 in a configuration or

pattern which differs from that shown in FIG. 254. Many other configurations are possible.

FIG. 259 is a bottom view of an article of footwear 22 showing a plurality of traction members 115 extending through openings 72 in the upper 23 in a configuration or pattern which differs from that shown in FIG. 254. Many other configurations are possible.

FIG. 260 is a bottom view of an article of footwear 22 showing a plurality of traction members 115 extending through openings 72 in the upper 23 in a configuration or pattern which differs from that shown in FIG. 254. Many other configurations are possible.

FIG. 261 is a side exploded view of an article of footwear 22 showing a plurality of components including an insole 31, superior spring element 47, fastener 29, anterior outsole element 44, upper 23, strap 118 including closure means and at least one traction member 115, inferior spring element 50, and posterior outsole element 46. Instead, or in addition to a strap 118, it can be readily understood that a more conventional upper 23 could be used including a plurality of openings 72 and eyestays 139 for accommodating laces 121. Further, a strap 118 does not necessarily have to include a traction element 115. A traction element 115 or middle outsole element 45 can be formed as a separate and selectively removable part. The anterior outsole element 44 and posterior outsole element 46 can be affixed to the spring element 51, and particular portions of sub-components thereof, by chemical bonding, vulcanization, adhesive, self-adhesive, and also by mechanical engagement means including male parts 85 and female parts 86 such as snap-fit, tongue and groove, hook 27, fastener 29, hook and pile, and the like.

FIG. 262 is a bottom view of an anterior outsole element 44 including an outsole 43 having traction members 115 which are affixed in functional relation to a backing 30. The backing 30 extends between adjacent traction members 115, but is minimized therebetween by the inclusion of openings 72, thereby saving both weight and manufacturing cost.

FIG. 263 is a bottom view of an anterior outsole element 44 including an outsole 43 having traction members 115 which are affixed in functional relation to a backing 30. The backing 30 extends between adjacent traction members 115 and substantially underlies the forefoot area 58. The backing 30 can consist of a thin web 114 of the same material which is used to make the traction members 115, or a different formulation of the same material, or alternately, a completely different material composition. The presence of a backing 30 or web 114 can enable the anterior outsole element 44 to be inserted in position within the upper 23 causing the traction members 115 to extend through openings 72 in the inferior side 38 of the upper 23, e.g., as shown in FIG. 254. The thin web 114 or backing 30 can then serve to maintain the registered orientation of the traction members 115, and also serve as a stop thereby preventing the individual traction members 115 and anterior outsole element 44 from passing completely through the upper 23. The anterior outsole element 44 can include male and/or female three dimensional structures for mating with compatible male and/or female three dimensional structures included or affixed upon the superior spring element 47, as shown in FIGS. 287 and 288.

FIG. 264 is a top view of an anterior outsole element 44 including an outsole 43 having traction members 115 which are affixed in functional relation to a backing 30, an opening 72, and fasteners 29 having female parts 86.

FIG. 265 is a top view of an anterior outsole element 44 including an outsole 43 having traction members 115 that

are affixed in functional relation to a backing 30, openings 72, a plurality of fasteners 29 which include both male parts 85 and also female parts 86.

FIG. 266 is a side cross-sectional view of a portion of a spring element 51 and a fastener 29 including a male part 85 having a hook 27. When the spring element 51 is made of metal, the opening 72 and fastener 29 including a male part 85 and a hook 27 can be formed by being cut or punched. Alternately, the male part 85 can be molded or affixed in position with a fastener 29. In any case, the male part 85 can engage a complimentary female part 86 and thereby affix the spring element 51 to an upper 23 or a portion of the sole 32 of an article of footwear 22.

FIG. 267 is a top view of the spring element 51 having an opening 72 and a fastener 29 including a male part 85 having a hook 27 shown in FIG. 266.

FIG. 268 is a top view of a spring element 51 and a fastener 29 including a female part 86 having an opening 72 and a notch 71.

FIG. 269 is a side cross-sectional view of a spring element 51 and an alternate fastener 29 including a male part 85 having a hook 27.

FIG. 270 is a top view of the fastener 29 including a male part 85 having a hook 27 shown in FIG. 269.

FIG. 271 is a side cross-sectional view of a spring element 51 and an alternate fastener 29 including a male part 85 having a hook 27.

FIG. 272 is a top view of the fastener 29 including a male part 85 having a hook 27 shown in FIG. 271.

FIG. 273 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 such as a screw or bolt and a female part 86 such as a nut.

FIG. 274 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 and a female part 86. The female part 86 of the fastener 29 can further include its own male part 85.1 having both an upper and lower flange 124 for engaging a complimentary female part possibly associated with the upper 23, backing 30, or a portion of the sole 32.

FIG. 275 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 and a female part 86. The male part 85 can pass through a bushing 125 which is inserted into an opening in the spring element 51. The female part 86 of the fastener 29 can further include its own male part 85.1 having a lower flange 124 for engaging a complimentary female part possibly associated with the upper 23, backing 30, or a portion of the sole 32.

FIG. 276 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 and a female part 86. The female part 86 of the fastener 29 can also further include its own male part 85.1 having a lower flange 124 for engaging a complimentary female part 86 possibly associated with the upper 23, backing 30, or a portion of the sole 32.

FIG. 277 is a side cross-sectional view of a spring element 51 including an opening 72 and a fastener 29 including a male part 85 having a hook 27. The male part 85 having a hook 27 can consist of a portion of the backing 30 or sole 32, and can be affixed in functional relation to the female part 86 including a recessed opening 72 in the spring element 51.

FIG. 278 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 affixed to a female part 86 which consists of a portion of the backing 30 to which is affixed a portion of the sole 32. Alternately, as shown in FIG. 286, the female part 86 can consist of a portion of the sole 32 without the presence of an intermediate layer of backing 30.

FIG. 279 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 and a female part 86. The female part 86 can include a male part 85.1 such as a flange 124 for engaging a complimentary female part possibly associated with the upper 23, backing 30, or a portion of the sole 32.

FIG. 280 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 having a flange 124. As shown, the fastener 29 can optionally pass through a bushing 125 which is inserted in the spring element 51. Alternately, the superior side 37 of the spring element 51 and/or bushing 125 can be recessed so that the male part 85 fits relatively flush. The inferior side 38 of the fastener 29 includes a flange 124 for engaging a complimentary female part possibly associated with the upper 23, backing 30, or a portion of the sole 32.

FIG. 281 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 and a female part 86. The female part 86 includes an extension which can fit into the spring element 51 in the manner of a bushing 125, and also includes upper and lower male parts 85.1 consisting of flanges 124. The upper flange 124 serves as a stop against the inferior side 38 of the spring element 51 when the male part 85 and female part 86 are affixed in functional relation, whereas the lower flange 124 can be used to engage a complimentary female part possibly associated with the upper 23, backing 30, or a portion of the sole 32.

FIG. 282 is a side cross-sectional view of a spring element 51 and a fastener 29 including a male part 85 including an upper and lower flange 124, and a female part 86. The female part 86 fits into recess on the superior side 37 of the spring element 51 and can be positioned into an opening 72 therein, and the male part 85 can then be affixed to the female part 86 from the inferior side 38 of the spring element 51. The upper flange 124 on the male part 85 serves as a stop against the inferior side 38 of the spring element 51 when the male part 85 and female part 86 are affixed in functional relation, whereas the lower flange 124 on the male part 85 can be used to engage a complimentary female part possibly associated with the upper 23, backing 30, or a portion of the sole 32.

FIG. 283 is a medial side external view of an article of footwear 22 with parts broken away showing the use of a selectively removable strap 118, a spring element 51 having outsole 43 traction members 115 affixed thereto, and an upper 23 that is substantially closed on the superior side 37 in the manner of the so-called "Fluoruchs" style shoe upper as commercialized by Nike, Inc., e.g., in the HUARACHE®, MUOWABB®, and more recently, the PRIESTO®, that is, the upper 23 does not include a conventional U or V shaped opening on the superior side 37 in the forefoot area 58.

FIG. 284 is an internal longitudinal cross-sectional lateral side view of an article of footwear 22 showing a spring element 51 including traction members 115 extending through openings 72 in the upper 23, and a removable strap 118 which is substantially positioned inside the upper 23. The superior portions of the strap 118 are exposed, or otherwise accessible to a wearer on the superior side 37 of the upper 23. The strap 118 can include openings for the passage of traction members 115 therethrough, or alternately, can include traction members which can be caused to pass through openings in the inferior side 38 of the upper 23. The strap 118 also includes closure means 120 such as openings 72 and eyelets 139 for receiving laces 121, or other mechanical engagement means such as VELCRO® hook and pile. As shown, portions of the strap 118 can

extend through one or more retainers 123 which are affixed in functional relation to the inside of the vamp 52 of the upper 23.

FIG. 285 is an exploded medial side view of an article of footwear 22 which is somewhat similar to that shown in FIG. 261 showing a plurality of components including an insole 31, superior spring element 47, a fastener 29 including a male part 85 and female part 86, anterior outsole element 44, middle outsole element 45, upper 23, inferior spring element 50, and posterior outsole element 46. As shown, the middle outsole element 45 can be formed as a separate and selectively removable part. The anterior outsole element 44 can be affixed to the superior spring element 47 which can possibly include an anterior spring element 48. Further, the middle outsole element 45 can be affixed via fastener 29 to the superior spring element 47 which can possibly include a posterior spring element 49. The posterior outsole element 46 can be affixed to the inferior spring element 50 by chemical bonding, vulcanization, adhesive, self-adhesive, and also by mechanical engagement means including male parts 85 and female parts 86 such as snap-fit, tongue and groove, hook 27, fastener 29, hook and pile, and the like. If desired, the anterior outsole element 44 and middle outsole element 45 can also be affixed to their corresponding parts using like means. The inferior spring element 50 can be selectively and removably affixed to the superior spring element 47 by a fastener 29 including a male part 85 and a female part 86. It can be readily understood that at least a portion of the fastener 29 can be integrated or otherwise included as a portion of the inferior spring element 50, middle outsole element 45, or superior spring element 47, and as desired, the fastener 29 can either be made visible, or invisible to an observer or consumer on the exterior or interior of the article of footwear 22.

FIG. 286 is a cross-sectional side view of a spring element 51 and a fastener 29 including a male part 85 affixed to a female part 86 which constitutes a portion of the sole 32 such as a midsole 26 or outsole 43.

FIG. 287 is an exploded medial side view of an article of footwear 22 which is somewhat similar to that shown in FIG. 285 showing a plurality of components including an insole 31, superior spring element 47 including female mating structures 129, a fastener 29 including a male part 85 and female part 86, anterior outsole element 44 including male mating structures 128, middle outsole element 45, upper 23, inferior spring element 50, and posterior outsole element 46. As shown, the middle outsole element 45 can be formed as a separate and selectively removable part. The middle outsole element 45 can be affixed via fastener 29 to the superior spring element 47. The anterior outsole element 44 can be affixed in functional relation to the superior spring element 47 by engagement of the male mating structures 128 with the female mating structures 129. The male mating structures 128 and female mating structures 129 can be formed in semi-spherical shapes, or other mating geometric shapes such as square, rectangle, triangle, pentagon, hexagon, octagon, other symmetrical shapes, or asymmetrical shapes. The superior spring element 47 can possibly include an anterior spring element 48 and a posterior spring element 49. The posterior outsole element 46 can be affixed to the inferior spring element 50 by chemical bonding, vulcanization, adhesive, self-adhesive, and also by mechanical engagement means including male parts 85 and female parts 86 such as snap-fit, tongue and groove, hook 27, fastener 29, hook and pile, and the like. If desired, the anterior outsole element 44 and middle outsole element 45 can also be affixed to their corresponding parts using like means. The

inferior spring element 50 can be selectively and removably affixed to the superior spring element 47 by a fastener 29 including a male part 85 and a female part 86. It can be readily understood that at least a portion the fastener 29 can be integrated or otherwise included as a portion of the inferior spring element 50, middle outsole element 45, or superior spring element 47, and as desired, the fastener 29 can either be made visible, or invisible to an observer or consumer on the exterior or interior of the article of footwear 22.

FIG. 288 is an exploded medial side view of an article of footwear 22 which is somewhat similar to that shown in FIG. 287 showing a plurality of components including an insole 31, superior spring element 47 including male mating structures 128, a fastener 29 including a male part 85 and female part 86, anterior outsole element 44 including female mating structures 129, middle outsole element 45, upper 23, inferior spring element 50, and posterior outsole element 46. As shown, the middle outsole element 45 can be formed as a separate and selectively removable part. The middle outsole element 45 can be affixed via fastener 29 to the superior spring element 47. The anterior outsole element 44 can be affixed in functional relation to the superior spring element 47 by engagement of the female mating structures 129 with the male mating structures 128. The male mating structures 128 and female mating structures 129 can be formed in semi-spherical shapes, or other mating geometric shapes such as square, rectangle, triangle, pentagon, hexagon, octagon, other symmetrical shapes, or asymmetrical shapes. The superior spring element 47 can possibly include an anterior spring element 48 and a posterior spring element 49. The posterior outsole element 46 can be affixed to the inferior spring element 50 by chemical bonding, vulcanization, adhesive, self-adhesive, and also by mechanical engagement means including male parts 85 and female parts 86 such as snap-fit, tongue and groove, hook 27, fastener 29, hook and pile, and the like. If desired, the anterior outsole element 44 and middle outsole element 45 can also be affixed to their corresponding parts using like means. The inferior spring element 50 can be selectively and removably affixed to the superior spring element 47 by a fastener 29 including a male part 85 and a female part 86. It can be readily understood that at least a portion the fastener 29 can be integrated or otherwise included as a portion of the inferior spring element 50, middle outsole element 45, or superior spring element 47, and as desired, the fastener 29 can either be made visible, or invisible to an observer or consumer on the exterior or interior of the article of footwear 22.

FIG. 289 is an exploded medial side view of an article of footwear 22 which is generally similar to that shown in FIG. 287 showing a plurality of components including an insole 31, superior spring element 47 including female mating structures 129, a fastener 29 including a male part 85 and female part 86, anterior outsole element 44 including male mating structures 128, middle outsole element 45, upper 23, inferior spring element 50, and posterior outsole element 46. As shown, the middle outsole element 45 can be formed as a separate and selectively removable part. The middle outsole element 45 can be affixed via fastener 29 to the superior spring element 47. The anterior outsole element 44 can be affixed in functional relation to the superior spring element 47 by engagement of the female mating structures 129 with the male mating structures 128. The male mating structures 128 and female mating structures 129 can be formed in semi-spherical shapes, or other mating geometric shapes such as square, rectangle, triangle, pentagon, hexagon, octagon, other symmetrical shapes, or asymmetrical shapes. As

shown in FIG. 289, the superior spring element 47 includes an anterior spring element 48 and a posterior spring element 49 which can be affixed in functional relation by at least one fastener 29. The posterior outsole element 46 can be affixed to the inferior spring element 50 by chemical bonding, vulcanization, adhesive, self-adhesive, and also by mechanical engagement means including male parts 85 and female parts 86 such as snap-fit, tongue and groove, hook 27, fastener 29, hook and pile, and the like. If desired, the anterior outsole element 44 and middle outsole element 45 can also be affixed to their corresponding parts using like means. The inferior spring element 50 can be selectively and removably affixed to the superior spring element 47 by a fastener 29 including a male part 85 and a female part 86. It can be readily understood that at least a portion the fastener 29 can be integrated or otherwise included as a portion of the inferior spring element 50, middle outsole element 45, or superior spring element 47, and as desired, the fastener 29 can either be made visible, or invisible to an observer or consumer on the exterior or interior of the article of footwear 22.

FIG. 290 is a top view of a mold 126 for making a plurality of superior spring elements 47 using a fiber composite material 102. As shown, the configuration or pattern 25 for making the superior spring elements 47 can include arch support on the medial side 35, and both medial and lateral stabilizers or heel counter(s) 24. As shown in FIG. 290, the configuration for matching parts for use on the left and right feet can be placed together with their lateral sides 36 being adjacent, or alternately, can be placed side by side in a normal orientation. The configuration of the mold 126 for making multiple sets of matched pairs of parts can place the superior spring element patterns tip to tip as shown in FIG. 290, or alternately, tip to tail, tail to tail, side to side, and further, the pattern can also be nested in order to minimize material waste.

FIG. 291 is a longitudinal cross-sectional side view of an article of footwear 22 including a superior spring element 47, a posterior fluid-filled bladder 101.1, an inferior spring element 50, an anterior spring element 48.2, and an anterior fluid-filled bladder 102.1. As shown, the flexural axis 59 associated with the inferior spring element 50 is substantially consistent with the transverse axis 91.

FIG. 292 is a bottom plan view of the article of footwear 22 shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 substantially fill the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively.

FIG. 293 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 substantially fill the spaces between the inferior portion of the shoe upper 23 and superior spring element 47 and both the inferior spring element 50 and the anterior spring element 48.2, respectively. The fluid-filled bladder 101.1 can be formed so as to include a plurality of individual bladders or chambers 133a,

133b, and 133c, as shown, and the like. The chambers 133a, 133b, and 133c of fluid-filled bladder 101.1 can be in fluid communication with one another, or alternately, be individually sealed. The fluid-filled bladder and chambers can be filled with a gas at atmospheric pressure, or above atmospheric pressure. Alternately, the fluid-filled bladder and chambers can be in fluid communication with one the atmosphere. The material structure, geometry, and/or internal fluid pressure of the bladder 101.1 and its chambers can be varied so as to provide different physical and mechanical characteristics. For example, it could be advantageous in a running shoe for the area of the sole associated with chamber 133a to exhibit less stiffness in compression than chamber 133b, and for chamber 133b to exhibit less stiffness in compression than chamber 133c. In a similar manner, the fluid-filled bladder 101.2 can be formed so as to include a plurality of individual bladders or chambers 133d, 133e, 133f, and 133g, as shown, and the like. The chambers 133d, 133e, 133f, and 133g of fluid-filled bladder 101.2 can be in fluid communication with one another, or alternately, be individually sealed. The fluid-filled bladder and chambers can be filled with a gas at atmospheric pressure, or above atmospheric pressure. Alternately, the fluid-filled bladder and chambers can be in fluid communication with one the atmosphere. The material structure, geometry, and/or internal fluid pressure of the bladder 101.2 and its chambers can be varied so as to provide different physical and mechanical characteristics. For example, it could be advantageous in a running shoe for the area of the sole associated with chambers 133d and 133e to exhibit less stiffness in compression than chambers 133f and 133g.

In the present application, it can be readily understood that those embodiments of an article of footwear that include fluid-filled bladders, and in particular, those including multiple fluid-filled bladders or fluid-filled bladders including multiple chambers, e.g., as shown in FIGS. 293, 294, 300, 301, and the like, can alternately include valves that can serve as a motion control device can be used, as taught in WO 01/70061 A2 entitled "Article of Footwear With A Motion Control Device, by John F. Swigert and assigned to Nike, Inc. Moreover, at least one fluid-filled bladder that forms part of a larger dynamically-controlled cushioning system can be used, as taught in WO 01/78539 A2 and U.S. Pat. No. 6,430,843 B1 entitled "Dynamically-Controlled Cushioning System For An Article of Footwear," by Daniel R. Potter and Allan M. Schrock, and assigned to Nike, Inc. Such an article of footwear can include at least one fluid-filled bladder including a plurality of chambers, a control system possibly including a CPU, a pressure detector, and a regulator for modulating the level of fluid communication between different fluid-filled bladders or chambers. The patent applications in this paragraph have been previously incorporated by reference herein.

FIG. 294 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 substantially fill the spaces between the inferior portion of the shoe upper 23 and superior spring element 47 and both the inferior spring element 50 and the anterior spring element 48.2, respectively. The fluid-filled bladder 101.1 can be formed so as to include a plurality of individual bladders or chambers 133a and 133b, as shown, and the like. The chambers 133a and

133b of fluid-filled bladder 101.1 can be in fluid communication with one another, or alternately, be individually sealed. The fluid-filled bladder and chambers can be filled with a gas at atmospheric pressure, or above atmospheric pressure. Alternately, the fluid-filled bladder and chambers can be in fluid communication with one the atmosphere. The material structure, geometry, and/or internal fluid pressure of the bladder 101.1 and its chambers can be varied so as to provide different physical and mechanical characteristics. For example, it could be advantageous in a shoe intended for lateral movements such as basketball or tennis that the area of the sole associated with chamber 133a to exhibit greater stiffness in compression than chamber 133b. In a similar manner, the fluid-filled bladder 101.2 can be formed so as to include a plurality of individual bladders or chambers 133c, 133d, and 133e, as shown, and the like. The chambers 133c, 133d, and 133e of fluid-filled bladder 101.2 can be in fluid communication with one another, or alternately, be individually sealed. The fluid-filled bladder and chambers can be filled with a gas at atmospheric pressure, or above atmospheric pressure. Alternately, the fluid-filled bladder and chambers can be in fluid communication with one the atmosphere. The material structure, geometry, and/or internal fluid pressure of the bladder 101.2 and its chambers can be varied so as to provide different physical and mechanical characteristics. For example, it could be advantageous in a shoe intended for lateral movements such as basketball or tennis for the area of the sole associated with chamber 133c to exhibit greater stiffness in compression than chambers 133d and 133e.

FIG. 295 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 fill only a posterior portion of the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively. This construction creates an open void space between the anterior spacer 55.2 and fluid-filled bladder 101.2, and also between the flexural axis 59 and fluid-filled bladder 101.1.

FIG. 296 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 fill only a portion of the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively. This construction creates an open void space between the anterior spacer 55.2 and fluid-filled bladder 101.2 on the lateral side 36, and also posterior of the flexural axis 59 on the lateral side 36, associated with less stiffness in compression, which can be advantageous for use in a running shoe.

FIG. 297 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring ele-

ment 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 fill only a portion of the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively. This construction creates open void spaces encompassing fluid-filled bladders 101.1 and 101.2. This structure can result in both the medial side 35 and the lateral side 36 of the sole exhibiting less stiffness in compression than the middle portion, and can be possibly be advantageous in articles of footwear intended for certain lateral movements.

FIG. 298 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 fill only a portion of the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively. This construction creates open void spaces both anterior and posterior of the fluid-filled bladders 101.1 and 101.2, and the two bladders can then serve as supports and second fulcrum points for the inferior spring element 50, and anterior spring element 48.2, respectively.

FIG. 299 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 fill only a portion of the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively. This construction creates open void spaces in the middle of the sole 32 within substantially encompassing fluid-filled bladders 101.1 and 101.2, and can result in increasing the stiffness in compression about the medial side 35 and lateral side 36 of the sole 32. The construction can provide stability when articles of footwear are subjected to high loads.

FIG. 300 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 fill only a portion of the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively. This construction creates open void spaces in the middle of the sole 32 within substantially encompassing fluid-filled bladders 101.1 and 101.2, and can result in increasing the stiffness in compression about the medial side 35 and lateral side 36 of the sole 32. The construction can provide enhanced stability when articles of footwear are subjected to high loads. The fluid-filled bladders 101.1 and 101.2 can include a plurality of individual chambers 133 which are in fluid isolation, as shown in FIG. 300. In an alternate embodiment, the chambers 133 could be in fluid communication with one another and/or with the atmo-

sphere. As shown, the individual chambers 133 can be formed in a semi-spherical or dome shape, or other common geometric shapes. The spacing between the chambers 133 can be varied, and the semi-spherical or other geometric shapes can also be alternately inverted and stacked upon one another in the vertical dimension as disclosed in U.S. Pat. No. 6,098,313, U.S. Pat. No. 6,029,962, U.S. Pat. No. 5,976,451, and U.S. Pat. No. 5,572,804 granted to Joseph Skaja and/or Martyn Shorten, all of these patents hereby being incorporated by reference herein.

FIG. 301 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 290 showing an inferior spring element 50 having a substantially transverse flexural axis 59, and the location of the fluid-filled bladders 101.1 and 101.2 as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 fill only a portion of the spaces between the inferior portion of the shoe upper 23 and superior spring element 47, and both the inferior spring element 50 and the anterior spring element 48.2, respectively. This construction creates open void spaces on the lateral side 36 of the sole 32, and can result in relatively greater stiffness in compression on the medial side 35 than on the lateral side 36 of the sole 32 in both the rearfoot area 68 and forefoot area 58. This construction can be advantageous for use in a running shoe. The fluid-filled bladders 101.1 and 101.2 can include a plurality of individual chambers 133 which are in fluid isolation, as shown in FIG. 301.

In an alternate embodiment, the chambers 133 could be in fluid communication with one another and/or with the atmosphere. As shown, the individual chambers 133 can be formed in a semi-spherical or dome shape, or other common geometric shapes. The spacing between the chambers 133 can be varied, and the semi-spherical or other geometric shapes can also be alternately inverted and stacked upon one another in the vertical dimension as disclosed in U.S. Pat. No. 6,098,313, U.S. Pat. No. 6,029,962, U.S. Pat. No. 5,976,451, and U.S. Pat. No. 5,572,804 granted to Joseph Skaja and/or Martyn Shorten, all of these patents being previously incorporated by reference herein. Alternately, a plurality of foam columns can be used in place of fluid-filled bladders, and the former can be made of the materials taught in U.S. Pat. No. 5,343,639 and U.S. Pat. No. 5,535,523.

Alternately, a plurality of support structures for placement and use between the superior spring element 47 and an inferior spring element 50 and/or anterior spring element 48.2 can be made of the materials taught in U.S. Pat. No. 4,198,037 and U.S. Pat. No. 5,280,890 assigned to Miner, Enterprises, Inc., and/or those materials taught in U.S. Pat. No. 5,337,492, U.S. Pat. No. 5,461,800, and U.S. Pat. No. 5,822,886 assigned to Adidas International, BV, and the like.

FIG. 302 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 304 showing a fluid-filled bladder 101 extending substantially the entire length of the sole 32, as if it were possible to view the structure through a transparent outsole 43 and anterior spring element 48.2. The embodiment shown in FIG. 302 does not include an inferior spring element 50, but does include a superior spring element 47 and an anterior spring element 48.2. The fluid-filled bladder 101 can be made by injection molding and/or blow molding and include an integral anterior spacer 55.3.

FIG. 303 is a bottom plan view of an article of footwear 22 generally similar to that shown in FIG. 305 showing a fluid-filled bladder 101.2 extending posterior of anterior

spacer 55.2 and anterior of the flexural axis 59 of the inferior spring element 50, and a fluid-filled bladder 101.1 substantially located posterior of the flexural axis 59, as if it were possible to view these structures through a transparent outsole 43, inferior spring element 50, and anterior spring element 48.2. The embodiment shown in FIG. 303 includes an inferior spring element 50, a superior spring element 47, and an anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 can be made by injection molding and/or blow molding, and fluid-filled bladder 101.2 can alternately include an integral anterior spacer 55.3.

FIG. 304 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 302 showing a fluid-filled bladder 101 extending substantially the entire length of the sole 32. The embodiment shown in FIG. 304 does not include an inferior spring element 50, but does include a superior spring element 47, posterior spring element 49, and an anterior spring element 48.2. The fluid-filled bladder 101 can be made by injection molding and/or blow molding and can possibly include an integral anterior spacer 55.3. The sole 32 including the fluid-filled bladder 101 and anterior spring element 48.2 can be affixed to the shoe upper 23 and superior spring element 47 with at least one fastener 29.

FIG. 305 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 303 showing a fluid-filled bladder 101.2 extending posterior of anterior spacer 55.2 and anterior of the flexural axis 59 of the inferior spring element 50, and also a fluid-filled bladder 101.1 substantially located posterior of the flexural axis 59. The embodiment shown in FIG. 305 includes an inferior spring element 50, a superior spring element 47, and an anterior spring element 48.2. The fluid-filled bladders 101.1 and 101.2 can be made by injection molding and/or blow molding, and fluid-filled bladder 101.2 can alternately include an integral anterior spacer 55.3. The sole 32 including the fluid-filled bladders 101.1, 101.2, the inferior spring element 50, anterior spring element 48.2, anterior outsole element 44, and posterior outsole element 46, can be affixed to the shoe upper 23 and superior spring element 47 with at least one fastener 29. As shown, the anterior outsole element 44 includes a backing 30 which wraps around both the posterior and anterior ends of the anterior spring element 48.2, and the backing can be secured by being at least partially trapped between the anterior spacer 55.2 and/or affixed by at least one fastener 29.

FIG. 306 is a longitudinal cross-sectional side view of an article of footwear 22 including a shoe upper 22, insole 31, fastener 29 having a male part 85 and a female part 86, a male mating structure 128 and a female mating structure 129, an anterior outsole element 44 including a backing 30, a posterior outsole element 46 including a backing 30 and a pocket 131, a spring element 51 including an inferior spring element 50, and a superior spring element 47 including both an anterior spring element 48 and a posterior spring element 49. Also indicated are the anterior side 33, posterior side 34, superior side 37, and inferior side of the article of footwear 22.

FIG. 307 is an exploded longitudinal cross-sectional side view of the article of footwear 22 shown in FIG. 306. As can be readily understood from studying FIG. 307, the anterior outsole element 44 can be inserted into the shoe upper 23 and the outsole portions 43 can pass through the corresponding registered openings 72 in the inferior side 34 of the upper 23 and be at least partially mechanically secured in place. The relatively thin backing 30 of the anterior outsole element 44 extends about and between the area of the openings

72 in the upper and prevents the backing 30 portion of the anterior outsole element 44 from passing through the upper 23. The anterior spring element 48 can include at least one male mating structure 128 having a protuberance 99 for mating with a corresponding opening 72 or female mating structure 129 in the backing 30 or other portion of the anterior outsole element 44. Accordingly, when the anterior spring element 48 is inserted into the shoe upper 23 it can at least partially be mechanically secured in place. The posterior spring element 49 can then be inserted into the shoe upper 23, and it can overlap the anterior spring element 48, and can possibly include a recess for accommodating and actually mating with the anterior spring element 48, as shown in FIG. 309. A fastener 29 including a male part 85, as shown, or alternately, a female part 86 can be inserted into an opening 72 in the superior spring element 49 which corresponds and registers with openings in the anterior spring element 48, the web or backing 30 portion of the anterior outsole element 44, shoe upper 23, inferior spring element 50, and the web or backing 30 portion of the posterior outsole element 46. The posterior outsole element 46 can then be slipped over the posterior end of the inferior spring element 50 and thereby at least partially mechanically secured in place, and the opening 72 in the resulting unit for accommodating the fastener 29 can be appropriately positioned enabling the male part 85, or alternately the female part 86, as shown, to be inserted therethrough from the inferior side 38 and then be mechanically secured to the corresponding mating part of the fastener 29 which is inserted from the superior side 37. This method and process of affixing the components of an article of footwear 22 can thereby be accomplished in a matter of seconds and easily in less than one minute. Accordingly, given a ready stock of components, an article of footwear 22 can be customized and made to order immediately upon request, and any part can be removed, and replaced, as desired.

FIG. 308 is a top plan view of the insole 31 shown in FIGS. 306 and 307. In order to provide comfort, cushioning, and support in functional relation to the underlying superior spring element 47, it is important that a relatively high quality insole be used such as one made of foamed neoprene rubber including a textile cover having an overall thickness of approximately 3.75 mm, or one made of polyurethane such as PORON® which is made by the 3M Company of St. Paul, Minn., and the like. Again, it can be advantageous to use a custom molded insole as taught by the present inventor in U.S. Pat. No. 5,632,057, and also patent application Ser. No. 10/234,508, entitled "Method of Making Custom Insoles and Point of Purchase Display, both of these documents having been previously incorporated by reference herein."

FIG. 309 is a top plan view of a spring element 51 showing a superior spring element 47 including both a posterior spring element 49 and an anterior spring element 48. Shown for reference purposes are the anterior side 33, posterior side 34, medial side 35, lateral side 36, and general orientation of the longitudinal axis 69, and transverse axis 91. The posterior spring element 49 overlaps a portion of the anterior spring element 48 which is shown in dashed lines. The posterior spring element 49 has a cupped shape so as to accommodate and encompass at least some of the natural anatomical characteristics of the heel of a wearer, and this three dimensional structure enables the part to exhibit relatively high flexural modulus or stiffness, thus permitting it to be made in a thin cross-sectional thickness resulting in low weight and reduced cost. The posterior spring element 49 can be made of a glass or carbon fiber composite material,

or alternately, of a relatively rigid reinforced thermoplastic material including short or long fibers. Again, Dow Chemical Company of Midland, Mich. makes SPECTRUM® reaction moldable polymer which has been used to make automobile body parts, and LNP Engineering Plastics of Exton, Pa. makes THERMOCOMP® and VERTON® thermoplastic materials which can include long carbon fibers. The posterior spring element 49 also includes a projection 70 on the anterior and medial side which has the effect of increasing the stiffness of the medial side 35 of the spring element 51 in the associated area. Both the posterior spring element 49 and the anterior spring element 48 include an opening 72 for accommodating a fastener 29, and can include a protective wear prevention insert 130 therein for bearing directly upon a portion of the fastener 29.

The anterior spring element 48 includes a plurality of notches 71 for influencing the longitudinal, transverse, and torsional stiffness, and overall performance of the part. The presence, location, shape, length, depth, and number of the notches 71 can be varied to make the anterior spring element more suitable for a particular activity, or a particular individual. The embodiment shown in FIG. 309 is appropriate for use in a running shoe. The longitudinal notch 71.1 near the anterior side 33 extends to the anterioinmost transverse line of flexion 54.2 and creates two opposing fingers 109.1 and 109.2 on the medial side 35 and lateral side 36, respectively. Given a spring element intended for use in a men's size 9 article of footwear, notches 71.5 and 71.6 on the medial side 35 can extend a relatively short distance such as approximately 15 mm, whereas notches 71.2, 71.3, and 71.4 can extend for a greater distance such as approximately 25 mm. The approximate alignment of notches 71.2 and 71.5 can create a generally transverse line of flexion 54.2 anterior of the approximate position of the metatarsal-phalangeal joints indicated by line 104. The approximate alignment of notches 71.3 and 71.6 can create a generally transverse line of flexion 54.3 generally consistent with the approximate position of the metatarsal-phalangeal joints indicated by line 104. The orientation of notch 71.4 can create a generally diagonal line of flexion 54.4 approximately following the anterior side of the posterior spring element 49. The proximity of notches 71.5 and 71.6 can create a generally longitudinal line of flexion 54.6 therebetween which can reduce both the stiffness in compression and torsional stiffness of the medial side 35 and enhance stability by reducing certain leverage effects which could impact inversion or eversion of a wearer's foot in an undesired manner. Similarly, the proximity of notches 71.2 and 71.3 and 71.4 can create a generally longitudinal line of flexion 54.1 therebetween which can reduce both the stiffness in compression and torsional stiffness of the lateral side 36 and enhance stability by reducing certain leverage effects which could impact inversion or eversion of a wearer's foot in an undesired manner.

In particular, on the lateral side 36 of the forefoot area 58 of a running shoe, it can be advantageous to create an extended area characterized by reduced stiffness in compression and torsional stiffness, or what can be called a "forefoot strike zone" somewhat analogous to the "rearfoot strike zone" which has been previously taught by the inventor in U.S. Pat. No. 5,425,184, U.S. Pat. No. 5,625,964, and U.S. Pat. No. 6,055,746, hereby incorporated by reference herein. Further, it can be advantageous in a running shoe for the stiffness in compression and torsional stiffness exhibited on the lateral side 36 of the anterior spring element 48 in the forefoot area 58 to be less than that exhibited on the medial side 35, and by a factor generally in the range between

10-50 percent. In this regard, it is generally known by those who study biomechanics that at lower speeds, as when an individual is walking or running slowly, the lateral side of the human foot is used to greater degree than when running at high speeds, thus the human foot can exhibit differential stiffness and utilization as between the lateral side and medial side. In brief, as result of the presence, location, shape, length, depth, and number of the notches 71 shown in FIG. 309, the anterior spring element 48 is perceived to provide enhanced cushioning, stability, and performance effects without the flexural or torsional modulus characteristics of the fiber composite material causing dysfunctional leverage effects or other undesired perceived phenomenon. Other configurations are possible and anticipated, e.g., notches 71.6 and 71.3 could be moved more towards the posterior side 34 to be placed well behind line 104 indicating the approximate location of the metatarsal-phalangeal joints.

FIG. 310 is a bottom plan view of the spring element 51 shown in FIG. 309 showing an inferior spring element 50, and a superior spring element 47 including both a posterior spring element 49 and an anterior spring element 48 that is substantially hidden by the anterior outsole element 44, thus shown by a dashed line. Shown are the anterior outsole element 44 and the posterior outsole element 46 including a web or backing 30 portion. The inferior side of the male mating structure 128 including a protuberance 99 is shown in functional relation with an opening or female mating structure in the backing 30 of the anterior outsole element 44.

FIG. 311 is a top plan view of an alternate posterior spring element 49 for use with an article of footwear 22 that includes raised heel counter 24 portions on both the medial side 35 and the lateral side 36 which are best shown in a side view of an article of footwear such as FIG. 323. Shown for reference purposes is the general orientation of the longitudinal axis 67, transverse axis 91, medial side 35, lateral side, anterior side 33 and posterior side 34. Also shown is the approximate position corresponding to the weight bearing center of the heel 57 of a wearer. In addition, a triangular opening 72 for accommodating a fastener that includes a wear prevention insert 130 is also shown in FIG. 311.

FIG. 312 is a top plan view of an alternate anterior spring element 48 which is generally similar to that shown in FIG. 309 for use with the posterior spring element 49 shown in FIG. 311. However, the shape of the part is different in several respects, e.g., the posterior side 34 of the anterior spring element 48 is formed in a diagonal shape, and the opening 72 for accommodating a fastener has a triangular instead of a pentagon shape.

FIG. 313 is a top plan view of the posterior spring element 49 of FIG. 311 and the anterior spring element 48 of FIG. 312 positioned in functional relation with the posterior spring element 49 overlapping the superior side 37 of the anterior spring element 48. In an alternate embodiment, the overlapping relationship can be reversed.

FIG. 314 is a bottom plan view of the posterior spring element 49 of FIG. 311 and the anterior spring element 48 of FIG. 312 positioned in functional relation with the posterior spring element 49 overlapping the anterior outsole element 44, but with the addition of the anterior outsole element 44 including a backing 30 and an outsole 43 including six triction members 115. As shown, the posterior spring element 49 overlaps the anterior outsole element 44 on the superior side 37, thus the anterior outsole elements 44 passes underneath the posterior spring element 49. In an alternate embodiment, the overlapping relationship of these three components can be varied. On the superior side 37, the

backing 30 portion of the anterior outsole element 44 includes a plurality of male mating structures 128 including a protuberance 99 which can mechanically mate with female mating structures 129 in the anterior spring element 48, and thereby at least partially secure the anterior outsole element 44 in functional relation to the overlaying anterior spring element 48.

FIG. 315 is a top plan view of an alternate posterior spring element 49 generally similar to that shown in FIG. 311 for use with an article of footwear 22 that includes raised heel counter 24 portions on both the medial side 35 and the lateral side 36 which are best shown in a side view of an article of footwear such as FIG. 323. Shown for reference purposes is the general orientation of the longitudinal axis 67, transverse axis 91, medial side 35, lateral side, anterior side 33 and posterior side 34. Also shown is the approximate position corresponding to the weight bearing center of the heel 57 of a wearer. Further, a hexagonal opening 72 for accommodating a fastener that includes a wear prevention insert 130 is also shown in FIG. 315. In addition, the posterior spring element 49 includes a recess 84 on the superior side 37 for accommodating and mechanically mating with the posterior portion of an anterior spring element 48. The location of a length measurement that is taken between the center of opening 72 and the posterior side 34, and also the location of a transverse width measurement that extends between the medial side 35 and lateral side 36 and intersects the center of the opening 72 is also shown in FIG. 315.

FIG. 316 is a top plan view of an alternate anterior spring element 48 generally similar to that shown in FIG. 312 for use with the posterior spring element 49 shown in FIG. 315. However, the shape of the part is different in several respects, e.g., the posterior side 34 of the anterior spring element 48 is formed in a pointed shape thereby forming a projection 70, and the opening 72 for accommodating a fastener has a hexagon shape instead of a triangular shape. The location of a length measurement that is taken between the center of opening 72 and the anterior side 33, and also the location of a transverse width measurement that extends along line 104 between the medial side 35 and lateral side 36 is also shown in FIG. 316.

FIG. 317 is a top plan view of the posterior spring element 49 of FIG. 315 and the anterior spring element 48 of FIG. 316 positioned in functional relation with the anterior spring element 48 overlapping the superior side 37 of the posterior spring element 49. In an alternate embodiment, the overlapping relationship can be reversed. The pointed shape of the projection 70 of the anterior spring element 48 is shown positioned in functional relation and at least partially secured by mechanical means within the recess 84 of the posterior spring element 49.

FIG. 318 is a bottom plan view of the posterior spring element 49 of FIG. 315 and the anterior spring element 48 of FIG. 316 positioned in functional relation with the anterior spring element 48 overlapping the superior side 37 of the posterior spring element 49, but with the addition of an anterior outsole element 44 including a backing 30 and an outsole 43 including six traction members 115. Similar to the anterior spring element 48, a portion of the anterior outsole element 44 also has a pointed shape including a projection 70.1 that overlaps the superior side 37 of the posterior spring element 49. In an alternate embodiment, the overlapping relationship of these three components can be varied. On the superior side 37, the backing 30 portion of the anterior outsole element 44 includes a plurality of male mating structures 128 including a protuberance 99 which can mechanically mate with female mating structures 129 in the anterior

anterior spring element 48, and thereby at least partially secure the anterior outsole element 44 in functional relation to the overlaying anterior spring element 48.

FIG. 319 is a top plan view of the superior side 37 of an inferior spring element 50 to which has been mounted a posterior outsole element 46 including a backing 30 and outsole 43. If desired, the backing 30 can be substantially transparent and can enable the portion of the posterior spring element 49 that is inserted into an opening or pocket 131 therein to be seen, as shown in FIG. 319. As shown, the backing 30 and/or posterior outsole element 46 can encompass a portion of the medial side 35, lateral side 36, superior side 37, inferior side 38, and posterior side 34 of the inferior spring element 50 forming an opening or pocket 131 into which a portion of the inferior spring element 50 can be removably inserted, thereby at least partially securing the posterior outsole element 46 by mechanical means in functional relation to the inferior spring element 50. Also shown is a triangular opening 72 including a wear prevention insert 130 for accommodating a fastener, thus the embodiment shown could be used with the posterior spring element 49, anterior spring element 48, and anterior outsole element 44 shown in FIG. 314.

FIG. 320 is a bottom plan view of the inferior spring element 50 and posterior outsole element 46 shown in FIG. 319. Near the anterior side 33, the web or backing 30 portion of the posterior outsole element 46 emerges from the ground engaging portion of the outsole 43 in a relatively superior position and the backing 30 also includes an opening 72 that registers with the similar opening present in the inferior spring element 50 for accommodating a fastener. Accordingly, once the inferior spring element 50 is inserted into the pocket 131 formed by posterior outsole element 46 and a fastener passes through the opening 72 present in the backing 30 and inferior spring element, the posterior outsole element 46 can be firmly secured solely by mechanical means to a larger spring element 51 and article of footwear 22.

FIG. 321 is a bottom plan view of an inferior spring element 40 element 50 similar to that shown in FIG. 320 with a posterior outsole element 46 having an alternate design. As shown, the web or backing 30 portion of the posterior outsole element 46 can be exposed in many areas creating a striking visual design, and in particular, when contrasting colors are used. However, such designs can also be functional, as they can be associated with varying elevations associated with the creation of discrete traction members 115.

FIG. 322 is a bottom plan view of an inferior spring element 50 similar to that shown in FIG. 320 with a posterior outsole element 46 having an alternate design. As shown, the web or backing 30 portion of the posterior outsole element 46 can be exposed in many areas creating a striking visual design, and in particular, when contrasting colors are used. However, such designs can also be functional, as they can be associated with varying elevations associated with the creation of discrete traction members 115. The posterior outsole element 46 and inferior spring element 50 include an opening 72 having a hexagon shape, thus the embodiment shown could be used with the posterior spring element 49, anterior spring element 48, and anterior outsole element 44 shown in FIG. 318.

FIG. 323 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 306, but including a number of differences. Shown is a footwear last 80 and a shoe upper 23 having a different design. In the forefoot area 58, the superior side of the backing 30 includes male mating structures 128 including a

protuberance 99 that is shown mechanically engaged in functional relation with a female mating structure 129 present in the anterior spring element 48. Similar to FIG. 306, the posterior spring element 49 overlaps the superior side of the backing 30 portion of the anterior outsole element 44 and the anterior spring element 48, and the latter structures both terminate at a location between the position of the fastener 29 and the posterior side 34 of the article of footwear 22. When a footwear last 80 or other three dimensional design and pattern of an article of footwear 22 includes a curved arch portion, this construction can be advantageous since it enables an especially smooth transition between the posterior spring element 49 and the anterior spring element 48 and anterior outsole element 44. As shown in FIG. 323, the posterior spring element 49 extends upwards and about the medial side 35, lateral side 36, and posterior side 34 within the shoe upper 23 forming a heel counter 24.

FIG. 324 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 323, but including a number of differences. The anterior spring element 48 overlaps the superior side of the posterior spring element 49 and is mechanically engaged by a recess 84.1 therein which is generally similar to that shown in FIGS. 315-317. The posterior spring element 49 overlaps the superior side of the posterior portion of the backing 30 of the anterior outsole element 44 and is also mechanically engaged by a recess 84.2 therein. As shown in FIG. 324, the thickness of the posterior portion of the backing 30 of the anterior outsole element 44 can be varied in the area near the anterior side of the posterior spring element 49 in order to achieve a smooth transition. As shown in FIG. 324, the backing 30 portion of the anterior outsole element 44 can extend substantially to the posterior side 34 within the shoe upper 23 and can be curved upwards about the medial side 35, lateral side 36, and posterior side 34 within the shoe upper 23 forming a heel counter 24. Alternately, the posterior spring element 49 can be curved upwards about the medial side 35, lateral side 36, and posterior side 34 within the shoe upper 23 forming a heel counter 24, or alternately, both the posterior spring element 49 and the backing 30 portion of the anterior outsole element 44 can form a heel counter 24.

FIG. 325 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 323, but including a number of differences. The posterior spring element 49 overlaps both the anterior spring element 48 and the posterior portion of the web or backing 30 of the anterior outsole element 44. The anterior spring element 48 terminates a relatively short distance posterior of the position of the fastener 29, but the posterior portion of the web or backing 30 of the anterior outsole element 44 extends substantially to the posterior side 34 within the shoe upper 23. Again, as shown in FIG. 324, the backing 30 portion of the anterior outsole element 44 can extend substantially to the posterior side 34 within the shoe upper 23 and can be curved upwards about the medial side 35, lateral side 36, and posterior side 34 within the shoe upper 23 forming a heel counter 24. Alternately, the posterior spring element 49 can be curved upwards about the medial side 35, lateral side 36, and posterior side 34 within the shoe upper 23 forming a heel counter 24, or alternately, both the posterior spring element 49 and the backing 30 portion of the anterior outsole element 44 can form a heel counter 24.

FIG. 326 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 323, but including a number of differences. Both the anterior

spring element 48 and the posterior portion of the backing 30 of the anterior outsole element 44 overlap the anterior portion of the superior side of the posterior spring element 49 and are mechanically engaged by a recess 84 therein which is generally similar to that shown in FIGS. 315-317. However, a substantial portion of the thickness of the posterior spring element 49 is maintained and extends to its anterior side, thus creating a more pronounced inferior standoff position for the inferior spring element 50 to bear loads against and be mechanically affixed thereto. The three dimensional curved shape of the posterior spring element 49 associated with the area of the recess 84 can have the effect of strengthening the part and increasing its flexural modulus. The more pronounced inferior standoff configuration can potentially accommodate for greater deflection of the inferior spring element 50, and/or make available more space between the superior spring element 47 and the inferior spring element 50 for the insertion of other cushioning media such as fluid-filled bladders, foam materials, thermoplastic structures having geometric shapes, and the like.

FIG. 327 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 323, but including a number of differences. The posterior portion of the backing 30 of the anterior outsole element 44 terminates anterior of the position of the fastener 29. The anterior spring element 48 extends from a position near the anterior side 33 towards the posterior side 34 and passes through a slit 82 in the inferior side 38 of the shoe upper 23 that approximately coincides with the position of the fastener 29. In a bottom plan view, the slit 82 is substantially hidden from view by that portion of the inferior spring element 50 which bears against the inferior side 38 of the shoe upper 23. The posterior portion of the anterior spring element 48 thereby emerges from within the shoe upper 23 to the exterior side thereof and can be curved upwards about the medial side 35, lateral side 36, and posterior side 34 of the shoe upper 23 forming an external heel counter 24.1. The posterior spring element 49 can also be curved upwards about the medial side 35, lateral side 36, and posterior side 34 within the shoe upper 23 forming an internal heel counter 24.2 which can mechanically mate with the external heel counter 24.1 thereby firmly securing the shoe upper 23 therebetween when the fastener 29 is affixed in position.

FIG. 328 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 323, but including a number of differences. Shown in FIG. 328 is a fluid-filled bladder 101 having a wall 132 and a chamber 133 that is substantially located between the posterior spring element 49 and the inferior spring element 50. The fluid-filled bladder 101 can be inserted through the open space provided for entry and exit of a wearer's foot into an opening 72 in the inferior side 38 of the shoe upper 23 that closely registers with the shape of the downwardly projecting structure of the fluid-filled bladder 101, and the fluid-filled bladder 101 can be at least partially maintained in position and prevented from passing through the opening 72 by the existence of a flange 124 thereupon. The fluid-filled bladder 101 can then be firmly secured in position by the insertion of the posterior spring element 49 into the shoe upper 23 in a superior position relative to the fluid-filled bladder 101, and also by affixing the posterior spring element 49 with a fastener 29 to the inferior spring element 50. Alternately, the fluid-filled bladder can be affixed in functional relation to the shoe upper 23 and/or the inferior spring element 50 with the use of adhesives, bonding, or welding, and other conventional methods.

FIG. 329 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 328, but including a number of differences. As shown, the article of footwear 22 includes two fluid-filled bladders 101.1 and 101.2. Fluid-filled bladder 101.1 can be affixed by adhesives, bonding, welding, or other conventional means to the superior side of the backing 30 that is present on the superior side of the inferior spring element 50, and likewise, fluid-filled bladder 101.2 can be affixed by adhesives, bonding, welding, or other conventional means to the inferior side of the backing 30 that is present on the inferior side of the inferior spring element 50. Accordingly, the posterior outsole element 46 including the backing 30 and both the fluid-filled bladders 101.1 and 101.2 can be removed and replaced when the fastener 29 is removed and the inferior spring element 50 is slipped out of the pocket 131.

FIG. 330 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 329, but including a number of differences. As shown, the article of footwear 22 includes two fluid-filled bladders 101.1 and 101.2. Fluid-filled bladder 101.1 is integrally formed with so that its inferior wall 132 also serves as the backing 30 that is present on the superior side of the inferior spring element 50, or vice-versa, and likewise, fluid-filled bladder 101.2 is integrally formed with so that its superior wall 132 also serves as the backing 30 that is present on the inferior side of the inferior spring element 50. Accordingly, the posterior outsole element 46 including the backing 30 and both the fluid-filled bladders 101.1 and 101.2 can be removed and replaced when the fastener 29 is removed and the inferior spring element 50 is slipped out of the pocket 131. As shown, the superior wall 132 of fluid-filled bladder 101.1 can extend anteriorly and be secured between the inferior spring element 50 and the superior spring element 47, or alternately, the superior wall 132 can terminate at a position posterior of the point of contact between the inferior spring element 50 and the inferior portion of the shoe upper 23 or superior spring element 47.

FIG. 331 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 328, but including a number of differences. Fluid-filled bladder 101 can be seen and can optionally protrude from an opening 72 in the superior side of the insole 31, but it can also be seen and protrude from a corresponding registered opening in the inferior side of the shoe upper 23. The fluid-filled bladder 101 can be inserted and secured in position in the same manner as the embodiment recited in FIG. 328. However, as shown in FIG. 331, the inferior wall 132 of the fluid-filled bladder 101 can alternately be integrally formed with the backing 30 portion of the anterior outsole element 44, or alternately, the superior wall 132 of the fluid-filled bladder 101 can be integrally formed with the backing 30 portion of the anterior outsole element 44.

FIG. 332 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 328, but including a number of differences. Shown is a fluid-filled bladder 101 including a superior wall 132.1 and an inferior wall 132.2 and a plurality of chambers 133. The chambers 133 can be in fluid communication with one another, or alternately, the chambers 133 can be in fluid isolation from one another. The plurality of chambers 133 protrude from a plurality of corresponding registered openings 72 in the superior side of the backing which overlaps the superior side of the inferior spring element 50. Accordingly, the fluid-filled bladder 101 can be inserted into the pocket 130 formed by the shape of the backing 30 of the posterior outsole element 46 and the protruding chambers

133 can then be properly fitted, that is, pop into place so as to protrude from the openings 72. The inferior spring element 50 can then be inserted into the pocket 131 thereby trapping and mechanically securing the fluid-filled bladder 101 in position.

FIG. 333 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 331, but including a number of differences. Shown is a fluid-filled bladder 101.1 including a wall 132 and a plurality of chambers 133 that is integrally formed with its superior side being coincident with a posterior portion of the backing 30 of the anterior outsole element 44, and also a fluid-filled bladder 101.2 which is integrally formed with its superior side being coincident with a portion of the backing 30 of the anterior outsole element 44. As shown and discussed previously in connection with FIG. 300, the individual chambers 133 can be formed in a semi-spherical or dome shape, or other common geometric shapes. The spacing between the chambers 133 can be varied, and the semi-spherical or other geometric shapes can also be alternately inverted and stacked upon one another in the vertical dimension as disclosed in U.S. Pat. No. 6,098,313, U.S. Pat. No. 6,029,962, U.S. Pat. No. 5,976,451, and U.S. Pat. No. 5,572,804 granted to Joseph Skaja and/or Martyn Shorten, all of these patents being previously incorporated by reference herein.

FIG. 334 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 331, but including a number of differences. In particular, a foam cushioning element 135 made of foam material 134 having a web 144 portion including a flange 124 can instead be stock-fitted into an opening 72 in the inferior side of the shoe upper 23 and can protrude downwards therefrom to engage the inferior spring element 50 when the article of footwear 22 is sufficiently loaded by a wearer. The foam cushioning element 135 can be made in a multiplicity of alternate shapes. Alternately, the foam cushioning element 135 made of foam material 134 can be affixed to a backing 30 including a flange 124 made of a different material, that is, instead of having a web 144 and flange 124 made in continuity of a single homogenous foam material 124 as is shown. Again, the foam cushioning element 135.1 can be inserted into the shoe upper 23 and secured in place by mechanical means, and also be removed and replaced, as desired.

FIG. 335 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 332, but including a number of differences. In particular, a foam cushioning element 135 made of foam material 134 having a web 114 portion including a flange 124 and three columns can instead be stock-fitted into an opening 72 in the superior side of the backing 30 on the superior side of the inferior spring element 50 and can protrude upwards therefrom to engage the inferior side of the shoe upper 23 when the article of footwear 22 is sufficiently loaded by a wearer. The foam cushioning element 135 can be made in a multiplicity of alternate shapes. Alternately, the foam cushioning element 135 made of foam material 134 can be affixed to a backing 30 including a flange 124 made of a different material, that is, instead of having a web 144 and flange 124 made in continuity of a single homogenous foam material 124 as shown. Again, the foam cushioning element 135 can be inserted into a pocket 130 formed by the backing 30 of the posterior outsole element 46 and secured in place by mechanical means, and also be removed and replaced, as desired.

FIG. 336 is a longitudinal cross-sectional lateral side view of an article of footwear 22 generally similar to that

shown in FIG. 323, but including a number of differences. In this embodiment, the backing 30 portion of the anterior outsole element 44 includes an upwardly extending stability element 136 including stability element portions 136.1, 136.2, and 136.3 which can serve both to define the shape of the shoe upper 23, but also to stabilize the foot of a wearer in functional relation to the upper 23 and article of footwear 22. When a textile material or other material having elastic or substantial elongation characteristics is used in the construction of the forefoot area 58 of the upper 23, the presence of the stability element 136 including portions 136.1, 136.2, and 136.3 can at least in part define the shape and fit of the upper 23, and in particular, can prevent trauma to a wearer's toes due to the elastic material possibly working against and dragging across a wearer's toenails. Given the use of an upper 23 including a textile material or other material having elastic or substantial elongation characteristics in the forefoot area 58, it is also possible for the upper 23 to accommodate wearers having a range of different size length and width. For example, a given size small upper 23 could accommodate men's sizes in the range between size lengths 7-8.5, and size widths A-E; a given size medium upper 23 could accommodate men's sizes in the range between size lengths 9-10.5, and size widths A-E; and, a given large upper 23 could accommodate men's sizes in the range between size lengths 11-12.5, and size widths A-E. Further, the anterior outsole element 44 including the stability element 136 can be made in corresponding small, medium, and large sizes. Moreover, the anterior outsole element 44 including the stability element 136 can be made in more specific sizes corresponding to each  $\frac{1}{2}$  inch length size, and also each width size graduation between A-E. Furthermore, an anterior outsole element 44 possibly including a stability element 136 can be made in various different three dimensional shapes and configurations generally corresponding to different footwear 80, or other type of three dimensional rendering, or database relating to a desired model or pattern foot shape. The particular desired foot shape can be derived from a given individual wearer, and a customized anterior outsole element 44 possibly including a stability element 136 can be custom formed for the wearer when at least the backing portion 30 of the anterior outsole element 44 which can also substantially form the elevated structure of the stability element 136 is made from a thermoplastic material. It can be readily understood that alternate and generally equivalent sizing can also be made available using other footwear sizing scales and methods. Accordingly, an anterior outsole element 44 which can possibly include a stability element 136 can be used to at least partially define the length size and width size in the forefoot area 58, and thereby, more generally the length size and width size of an article of footwear 22.

Stability element 131.1 can wrap about the anterior side 33 within the upper 23, and stability elements 131.2 and 131.3 can be complimented by like structures on the medial side 35 which are suitably offset to accommodate for anatomical differences. Accordingly, a direct mechanical link can exist between the traction members 155 that are present on the anterior outsole element 44 and the stability elements 136.1, 136.2, and 136.3. The stability elements 136.1, 136.2 and 136.3 include notches 71.1 and 71.2 on the lateral side 36, and it can be readily understood that corresponding notches that would be suitably offset to accommodate for anatomical differences would be present on the medial side 35. The position of notch 71.2 approximately coincides with the location of a wearer's fifth metatarsal-phalangeal joint 89 and the position of notch 71.1 is more anterior, thus the stability elements 136.1, 136.2, and 136.3 do not substantially inhibit flexion of a wearer's foot about the metatarsal-phalangeal joints. The notches 71.1 and 71.2 terminate at a location near a tangent point which approximates the bottom net where the backing 30 curves to assume a substantially generally planar shape as it passes beneath the inferior side of the anterior spring element 48. It can be advantageous that the insole 31 extend upwards about the medial side 35, lateral side 36, and anterior side 33 to greater degree than is customary in a typical article of footwear in order to cushion and protect the wearer's foot from making substantial direct contact with the stability elements 136.1, 136.2, and 136.3, as shown in FIGS. 447, 448, and 480. If desired, the backing 30 and stability elements 136.1, 136.2, and 136.3 can be made of a transparent material as shown. It is anticipated that stability element 136 could be made in various alternate configurations, e.g., the stability element 136 could possibly extend upwards and be integrated with closure means such as laces or straps.

FIG. 337 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 336, but including a number of differences. In this embodiment, the backing 30 portion of the anterior outsole element 44 includes upwardly extending stability element 136 including stability element portions 136.1, 136.2, and 136.4 which can serve both to define the shape of the shoe upper 23, but also to stabilize the foot of a wearer in functional relation to the article of footwear 22. Stability element 136.1 can wrap about the anterior side 33 within the upper 23, and stability elements 136.2 and 136.4 can be complimented by like structures on the medial side 35 which are suitably offset to accommodate for anatomical differences. In particular, stability element 136.4 wraps about the posterior side 34 within the upper 23 to form a heel counter 24.

FIG. 338 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 336, but including a number of differences. In this embodiment, the backing 30 portion of the anterior outsole element 44 includes upwardly extending stability element 136 including stability element portions 136.1, 136.2, 136.3, and 136.5 which can serve both to define the shape of the shoe upper 23, but also to stabilize the foot of a wearer in functional relation to the article of footwear 22. Stability element 136.1 can wrap about the anterior side 33 within the upper 23, and stability elements 136.2, 136.3, and 136.5 can be complimented by like structures on the medial side 35 which are suitably offset to accommodate for anatomical differences. In particular, stability element 136.5 can wrap about the posterior side 34 within the upper 23 and form a heel counter 24. The stability elements 136.1, 136.2, 136.3 and 136.5 include notches 71.1, 71.2, and 71.3 on the lateral side 36, and it can be readily understood that corresponding notches that would be suitably offset to accommodate for anatomical differences would be present on the medial side 35. The position of notch 71.2 approximately coincides with the location of a wearer's fifth metatarsal-phalangeal joint 89 and the position of notch 71.1 is more anterior, thus the stability elements 136.1, 136.2, and 136.3 do not substantially inhibit flexion of a wearer's foot about the metatarsal-phalangeal joints. The notches 71.1 and 71.2 terminate at a location near a tangent point which approximates the bottom net where the backing 30 curves to assume a substantially generally planar shape as it passes beneath the inferior side of the anterior spring element 48. The position of notch 71.3 approximately coincides with the apex of the fastener 29, but also with the

curvature incorporated into the footwear last 80 corresponding to the longitudinal arches of a wearer's foot in the midfoot area 67, thus can accommodate deflection of the superior spring element 47. Again, the superior spring element 47 can include an anterior spring element 48 and a posterior spring element 49, as shown.

FIG. 339 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 336, but including a number of differences. In particular, the stability elements portions 136.1a, 136.2a, and 136.3a are part of a stability element 136a that is not a part or extension of the backing 30 portion of the anterior outsole element 44, rather the stability element 136a is a separate component or feature of the exterior of the upper 23. For example, stability element 136a can be made of a thermoplastic material or a polyurethane material that is directly injection molded and bonded to the upper 23, and the like. Alternately, a foam material can be applied to the upper 23 as taught in U.S. Pat. No. 5,785,909 granted to Chang et al. and U.S. Pat. No. 5,885,500 granted to Tawney et al., assigned to Nike, Inc., and the like. In this embodiment, the upwardly extending stability elements 136.1a, 136.2a, and 136.3a can serve both to define the shape of the shoe upper 23, but also to stabilize the foot of a wearer in functional relation to the article of footwear 22. Stability element 136.1a can wrap about the anterior side 33 of the upper 23, and stability elements 136.2a and 136.3a can be complimented by like structures on the medial side 35 which are suitably offset to accommodate for anatomical differences. In an alternate construction, the anterior outsole element 44 can be eliminated, and the traction members of the outsole 43 can be directly affixed to the stability element 136a. However, in the construction shown in FIG. 339, the traction members 115 emerge through registered openings 72 in the stability element 136a and can bear directly thereupon when deformed by generally transverse loads. Accordingly, a direct mechanical link can exist between the traction members 115 that are present on the anterior outsole element 44 and the stability element 136a. When a textile material or other material having elastic characteristics is used in the construction of the forefoot area 58 of the upper 23, the presence of the stability elements 136.1a, 136.2a, and 136.3a can at least in part define the shape and fit of the upper 23 to which they are affixed by conventional means, and in particular, can prevent trauma to a wearer's toes due to the elastic material possibly working against and dragging across their toenails. The stability elements 136.1a, 136.2a and 136.3a include notches 71.1 and 71.2 on the lateral side 36, and it can be readily understood that corresponding notches that would be suitably offset to accommodate for anatomical differences would be present on the medial side 35. The position of notch 71.2 approximately coincides with the location of a wearer's fifth metatarsal-phalangeal joint 89 and the position of notch 71.1 is more anterior, thus the stability elements 136.1a, 136.2a, and 136.3a do not substantially inhibit flexion of a wearer's foot about the metatarsal-phalangeal joints. The notches 71.1 and 71.2 terminate at a location near a tangent point which approximates the bottom net where the stability element 136a curves to assume a substantially generally planar shape as it passes beneath the inferior side of the anterior spring element 48. It can be advantageous that the insole 31 extend upwards about the medial side 35, lateral side 36, and anterior side 33 to greater degree than is customary in a typical article of footwear in order to cushion and protect the wearer's foot from making substantial direct contact with the stability elements 136.1a, 136.2a, and 136.3a. If desired, the stability

element 136a can be made of a transparent material as shown, or a thermoplastic material including decorative sublimation printing, and the like. The stability element 136a could have other configurations, and portions could possibly extends upwards to link with closure means such as laces or straps included in the construction of the upper 23.

FIG. 340 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 337, but including a number of differences. In particular, the stability elements portions 136.1b, 136.2b, and 136.4b are part of a larger stability element 136b that is not a part or extension of the backing 30 portion of the anterior outsole element 44, rather the stability element 136b is a separate component or feature of the exterior of the upper 23. For example, stability element 136b can be made of a thermoplastic material or a polyurethane material that is directly injection molded and bonded to the upper 23, and the like. Alternately, a foam material can be applied to the upper 23 as taught in U.S. Pat. No. 5,785,909 granted to Chang et al. and U.S. Pat. No. 5,885,500 granted to Tawney et al., assigned to Nike, Inc., and the like. In this embodiment, the upwardly extending stability elements 136.1b, 136.2b, and 136.4b can serve both to define the shape of the shoe upper 23, but also to stabilize the foot of a wearer in functional relation to the article of footwear 22. Stability element 136.1b can wrap about the anterior side 33 of the upper 23, and stability elements 136.2b and 136.4b can be complimented by like structures on the medial side 35 which are suitably offset to accommodate for anatomical differences. Stability element 136.4b can wrap about the posterior side 34 of the upper 23 to form a heel counter 24. In an alternate construction, the anterior outsole element 44 can be eliminated, and the traction members of the outsole 43 can be directly affixed to the stability element 136b. However, in the construction shown in FIG. 340, the traction members 115 emerge through registered openings 72 in the stability element 136b and can bear directly thereupon when deformed by generally transverse loads. Accordingly, a direct mechanical link can exist between the traction members 115 that are present on the anterior outsole element 44 and the stability element 136b. When a textile material or other material having elastic characteristics is used in the construction of the forefoot area 58 of the upper 23, the presence of the stability elements 136.1b, 136.2b, and 136.4b can at least in part define the shape and fit of the upper 23 to which they are affixed by conventional means, and in particular, can prevent trauma to a wearer's toes due to the elastic material possibly working against and dragging across their toenails. The stability elements 136.1b, 136.2b and 136.4b include notches 71.1 and 71.2 on the lateral side 36, and it can be readily understood that corresponding notches that would be suitably offset to accommodate for anatomical differences would be present on the medial side 35. The position of notch 71.2 approximately coincides with the location of a wearer's fifth metatarsal-phalangeal joint 89 and the position of notch 71.1 is more anterior, thus the stability elements 136.1b, 136.2b, and 136.4b do not substantially inhibit flexion of a wearer's foot about the metatarsal-phalangeal joints. The notches 71.1 and 71.2 terminate at a location near a tangent point which approximates the bottom net where the stability element 136b curves to assume a substantially generally planar shape as it passes beneath the inferior side of the anterior spring element 48. It can be advantageous that the insole 31 extend upwards about the medial side 35, lateral side 36, anterior side 33, and posterior side 34 to greater degree than is customary in a typical article of footwear in order to cushion and protect the

wearer's foot from making substantial direct contact with the stability elements 136.1b, 136.2b, and 136.4b. If desired, the stability elements 136b could be made of a transparent material as shown, or a thermoplastic material including decorative sublimation printing, and the like. The stability element 136b could have other configurations, and portions could possibly extend upwards to link with closure means such as laces or straps included in the construction of the upper 23.

FIG. 341 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 338, but including a number of differences. In particular, the stability element portions 136.1c, 136.2c, 136.3c, and 136.5c are part of a larger stability element 136c that is not a part or extension of the backing 30 portion of the anterior outsole element 44, rather the stability element 136c is a separate component or feature of the exterior of the upper 23. For example, stability element 136c can be made of a thermoplastic material or a polyurethane material that is directly injection molded and bonded to the upper 23, and the like. Alternately, a foam material can be applied to the upper 23 as taught in U.S. Pat. No. 5,785,909 granted to Chang et al. and U.S. Pat. No. 5,885,500 granted to Tawney et al., assigned to Nike, Inc., and the like. In this embodiment, the upwardly extending stability elements 136.1c, 136.2c, 136.3c, and 136.5c can serve both to define the shape of the shoe upper 23, but also to stabilize the foot of a wearer in functional relation to the article of footwear 22. Stability element 136.1c can wrap about the anterior side 33 of the upper 23, and stability elements 136.2c, 136.3c and 136.5c can be complimented by like structures on the medial side 35 which are suitably offset to accommodate for anatomical differences. Stability element 136.5c can wrap about the posterior side 34 of the upper 23 to form a heel counter 24. In an alternate construction, the anterior outsole element 44 can be eliminated, and the traction members of the outsole 43 can be directly affixed to the stability element 136c. However, in the construction shown in FIG. 341, the traction members 115 emerge through registered openings 72 in the stability element 136c and can bear directly thereupon when deformed by generally transverse loads. Accordingly, a direct mechanical link can exist between the traction members 115 that are present on the anterior outsole element 44 and the stability element 136c. When a textile material or other material having elastic characteristics is used in the construction of the forefoot area 58 of the upper 23, the presence of the stability elements 136.1c, 136.2c, 136.3c, and 136.5c can at least in part define the shape and fit of the upper 23 to which they are affixed by conventional means, and in particular, can prevent trauma to a wearer's toes due to the elastic material possibly working against and dragging across their toenails. The stability elements 136.1c, 136.2c, 136.3c, and 136.5c include notches 71.1 and 71.2 on the lateral side 36, and it can be readily understood that corresponding notches that would be suitably offset to accommodate for anatomical differences would be present on the medial side 35. The position of notch 71.2 approximately coincides with the location of a wearer's fifth metatarsal-phalangeal joint 89 and the position of notch 71.1 is more anterior, thus the stability elements 136.1c, 136.2c, and 136.3c do not substantially inhibit flexion of a wearer's foot about the metatarsal-phalangeal joints. The notches 71.1 and 71.2 terminate at a location near a tangent point which approximates the bottom net where the stability element 136c curves to assume a substantially generally planar shape as it passes beneath the inferior side of the anterior spring element 48. It can be advantageous that the insole 31 extend

upwards about the medial side 35, lateral side 36, anterior side 33, and posterior side 34 to greater degree than is customary in a typical article of footwear in order to cushion and protect the wearer's foot from making substantial direct contact with the stability elements 136.1c, 136.2c, 136.3c and 136.5c. If desired, the stability element 136c can be made of a transparent material as shown, or a thermoplastic material including decorative sublimation printing, and the like. The stability element 136c could have other configurations, and portions could possibly extend upwards to link with closure means such as laces or straps included in the construction of the upper 23.

FIG. 342 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 341, but including a number of differences. As shown, the article of footwear 22 includes a first fluid-filled bladder 101.1 located between the inferior spring element 50 and the inferior side of the upper 23, and a second fluid-filled bladder 101.2 located between the anterior spring element 48.2 and the inferior side of the upper 23 including the anterior spring element 48.1. The fluid-filled bladders 101.1 and 101.2 can be affixed using adhesive, bonding, welding, or other conventional techniques. However, it can be advantageous for the fluid-filled bladders 101.1 and 101.2 to be affixed by mechanical means so that they can be customized, and removed and replaced, as desired. Again, the fluid-filled bladder 101.1 can be formed so that one of the walls 132 of the bladder is coincident or affixed to a portion of the backing 30 of the posterior outsole element 46 and/or the fluid-filled bladder 101.1 can include a thin web 114 extending therefrom which can be secured between the inferior spring element 50 and the inferior side of the upper 23. Likewise, the fluid-filled bladder 101.2 can be formed so that one of the walls 132 of the bladder is coincident or affixed to a portion of the backing 30 of the anterior outsole element 44 and/or the fluid-filled bladder 101.2 can include a thin web 114 extending therefrom which can be secured between the anterior spring element 48.2 and the inferior side of the upper 23, and/or between a portion of the anterior spacer 55.2 and an adjoining mating surface.

FIG. 343 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 342, but including a number of differences. The article of footwear 22 includes a cushioning element 135 made of foam material 134 located between the inferior spring element 50 and the inferior side of the upper 23, and a plurality of generally similar cushioning elements 135 located between the inferior anterior spring element 48.2 and the upper 23 including the superior anterior spring element 48.1. The cushioning elements 135 can be affixed using adhesive, bonding, welding, or other conventional techniques. The cushioning elements 135 can possibly be affixed at both their superior side and inferior side, or at only their superior side as shown in FIG. 344, or at only their inferior side as shown in FIG. 345, as desired. However, it can be advantageous for the cushioning elements 135 to be affixed by mechanical means so that they can be customized, and removed and replaced, as desired. In this regard, the cushioning elements 135 can be affixed to the backing 30 present on the posterior outsole element 46 and the anterior outsole element 44. Alternately, as shown and taught in FIG. 335, the cushioning elements 135 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the backing 30 portion of the posterior outsole element 46 or anterior outsole element 44 and can thereby be mechanically affixed in place when the inferior spring element 50 and/or the anterior spring

element 48.2 is inserted into the pocket 130 formed within either the posterior outsole element 46 or the anterior outsole element 50 and the posterior spring element 50 and/or the anterior spring element 46 are properly affixed in functional relation to the upper 23. Alternately, as shown and taught in FIG. 334, the cushioning elements 135 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the upper 23 and thereby be mechanically affixed in place when the superior spring element 47 possibly including a posterior spring element 49 and an anterior spring element 48.1 is inserted into the upper 23 and the inferior spring element 50 and/or the anterior spring element 48.2 are properly affixed in functional relation to the upper 23. The physical and mechanical properties of the various cushioning elements 135 can be homogeneous, or alternately, can be heterogeneous and varied so as to provide different physical and mechanical properties in various select areas of the sole 32 of the article of footwear 22. For example, it can possibly be advantageous to reduce the stiffness of the lateral side of the sole 32 in the rearfoot area 68 and forefoot area 58 in a running shoe.

FIG. 344 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 343, but including a number of differences. The article of footwear 22 includes a cushioning element 135 made of foam material 134 located between the inferior spring element 50 and the inferior side of the upper 23, and a plurality of generally similar cushioning elements 135 located between the anterior spring element 48.2 and the upper 23 including the anterior spring element 48.1. As shown, the cushioning elements 135 can be affixed on their superior side using adhesive, bonding, welding, or other conventional techniques. However, it can be advantageous for the cushioning elements 135 to be affixed by mechanical means so that they can be customized, removed and replaced, as desired. As shown and taught in FIG. 334, the cushioning elements 135 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the upper 23 and thereby be mechanically affixed in place when the superior spring element 47 possibly including a posterior spring element 49 and an anterior spring element 48.1 is inserted into the upper 23 and the inferior spring element 50 and/or the anterior spring element 48.2 are properly affixed in functional relation to the upper 23. The physical and mechanical properties of the various cushioning elements 135 can be homogeneous, or alternately, can be heterogeneous and varied so as to provide different physical and mechanical properties in various select areas of the sole 32 of the article of footwear 22. For example, it can possibly be advantageous to reduce the stiffness of the lateral side of the sole 32 in the rearfoot area 68 and forefoot area 58 in a running shoe.

FIG. 345 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 344, but including a number of differences. The article of footwear 22 includes a cushioning element 135 made of foam material 134 located between the inferior spring element 50 and the inferior side of the upper 23, and a plurality of generally similar cushioning elements 135 located between the anterior spring element 48.2 and the upper 23 including the anterior spring element 48.1. As shown, the cushioning elements 135 can be affixed on their inferior side using adhesive, bonding, welding, or other conventional techniques. However, it can be advantageous for the cushioning elements 135 to be affixed by mechanical means so that they can be customized, removed and replaced,

replaced, as desired. As shown and taught in FIG. 335, the cushioning elements 135 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the backing 30 portion of the posterior outsole element 46 or anterior outsole element 50 and can thereby be mechanically affixed in place when the inferior spring element 50 or the anterior spring element 48.2 is inserted into the pocket 130 formed within either the posterior outsole element 46 and/or the anterior outsole element 50 and the posterior spring element 50 and/or the anterior spring element 46 are properly affixed in functional relation to the upper 23. The physical and mechanical properties of the various cushioning elements 135 can be homogeneous, or alternately, can be heterogeneous and varied so as to provide different physical and mechanical properties in various select areas of the sole 32 of the article of footwear 22. For example, it can possibly be advantageous to reduce the stiffness of the lateral side of the sole 32 in the rearfoot area 68 and forefoot area 58 in a running shoe.

FIG. 346 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 342, but including a number of differences. The article of footwear 22 includes a fluid-filled bladder 101.1 located between the inferior spring element 50 and the inferior side of the upper 23, and a fluid-filled bladder 101.2 located between the anterior spring element 48.2 and the upper 23 including the anterior spring element 48.1. The fluid-filled bladders 101.1 and 101.2 can be affixed using adhesive, bonding, welding, or other conventional techniques. The fluid-filled bladders can possibly be affixed at both their superior side and inferior side as shown in FIG. 346, or at only their superior side as shown in FIG. 347, or at only their inferior side as shown in FIG. 348, as desired. However, it can be advantageous for the fluid-filled bladders 101.1 and 101.2 to be affixed by mechanical means so that they can be customized, removed and replaced, as desired. In this regard, the fluid-filled bladders 101.1 and 101.2 can be affixed to the backing 30 present on the posterior outsole element 46 and the anterior outsole element 44. Alternately, as shown and taught in FIG. 332, the fluid-filled bladders 101.1 and 101.2 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the backing 30 portion of the posterior outsole element 46 or anterior outsole element 44 and can thereby be mechanically affixed in place when the inferior spring element 50 and/or the anterior spring element 48.2 is inserted into the pocket 130 formed within either the posterior outsole element 46 or the anterior outsole element 50 and the posterior spring element 50 and/or the anterior spring element 46 are properly affixed in functional relation to the upper 23. Alternately, as shown and taught in FIG. 333, the fluid-filled bladders 101.1 and 101.2 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the upper 23 and thereby be mechanically affixed in place when the superior spring element 47 possibly including a posterior spring element 49 and an anterior spring element 48.1 is inserted into the upper 23 and the inferior spring element 50 and anterior spring element 48.2 are properly affixed in functional relation to the upper 23. The physical and mechanical properties associated with various chambers 103 and portions of the fluid-filled bladders 101.1 and 101.2 can be homogeneous, or alternately, can be heterogeneous and varied so as to provide different physical and mechanical properties in various select areas of the sole 32 of the article of footwear 22. For example, it can possibly be advanta-

geous to reduce the stiffness of the lateral side of the sole 32 in the rearfoot area 68 and forefoot area 58 in a running shoe.

FIG. 347 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 346, but including a number of differences. The article of footwear 22 includes a fluid-filled bladder 101.1 located between the inferior spring element 50 and the inferior side of the upper 23, and a fluid-filled bladder 101.2 located between the anterior spring element 48.2 and the upper 23 including the anterior spring element 48.1. The fluid-filled bladders 101.1 and 101.2 can be affixed using adhesive, bonding, welding, or other conventional techniques. As shown in FIG. 347, the fluid-filled bladders 101.1 and 101.2 are affixed on their superior side. However, it can be advantageous for the fluid-filled bladders 101.1 and 101.2 to be affixed by mechanical means so that they can be customized, and removed and replaced, as desired. As shown and taught in FIG. 333, the fluid-filled bladders 101.1 and 101.2 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the upper 23 and thereby be mechanically affixed in place when the superior spring element 47 possibly including a posterior spring element 49 and an anterior spring element 48.1 is inserted into the upper 23 and the inferior spring element 50 and anterior spring element 48.2 are properly affixed in functional relation to the upper 23. The physical and mechanical properties associated with various chambers 103 and portions of the fluid-filled bladders 101.1 and 101.2 can be homogenous, or alternately, can be heterogeneous and varied so as to provide different physical and mechanical properties in various select areas of the sole 32 of the article of footwear 22. For example, it can possibly be advantageous to reduce the stiffness of the lateral side of the sole 32 in the rearfoot area 68 and forefoot area 58 in a running shoe.

FIG. 348 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 347, but including a number of differences. The article of footwear 22 includes a fluid-filled bladder 101.1 located between the inferior spring element 50 and the inferior side of the upper 23, and a fluid-filled bladder 101.2 located between the anterior spring element 48.2 and the upper 23 including the anterior spring element 48.1. The fluid-filled bladders 101.1 and 101.2 can be affixed using adhesive, bonding, welding, or other conventional techniques. As shown in FIG. 347, the fluid-filled bladders 101.1 and 101.2 are affixed on their inferior side. However, it can be advantageous for the fluid-filled bladders 101.1 and 101.2 to be affixed by mechanical means so that they can be customized, and removed and replaced, as desired. In this regard, the fluid-filled bladders 101.1 and 101.2 can be affixed to the backing 30 present on the posterior outsole element 46 and the anterior outsole element 44. Alternately, as shown and taught in FIG. 332, the fluid-filled bladders 101.1 and 101.2 can include an integral backing or web 114 portion including a flange 124 and can be inserted through an opening 72 in the backing 30 portion of the posterior outsole element 46 or anterior outsole element 44 and can thereby be mechanically affixed in place when the inferior spring element 50 and/or the anterior spring element 48.2 is inserted into the pocket 130 formed within either the posterior outsole element 46 or the anterior outsole element 50 and the posterior spring element 50 and/or the anterior spring element 46 are properly affixed in functional relation to the upper 23. The physical and mechanical properties associated with various chambers 103 and portions of the fluid-filled bladders 101.1 and 101.2 can be homogenous, or

alternately, can be heterogeneous and varied so as to provide different physical and mechanical properties in various select areas of the sole 32 of the article of footwear 22. For example, it can possibly be advantageous to reduce the stiffness of the lateral side of the sole 32 in the rearfoot area 68 and forefoot area 58 in a running shoe.

FIG. 349 is a lateral side 36 view of a shoe upper 23 mounted on a footware last 80. The upper 23 can be made with the use conventional patterns, materials, and means known in the prior art, and can include openings 72 and possibly eyestays for accommodating laces and/or other conventional closure means. Shown is an upper 23 including a natural or synthetic textile material 137 such as a woven or knit fabric, and the like. It can be readily understood that the textile material 137 can consist of a circular knitted and/or three dimensional textile material, a multi-layer textile material, water resistant or waterproof materials, shape memory textile materials, or stretchable and elastic textile materials, and the like.

The textile material 137 included in the upper 23 can also be formed by circular knitting and/or three dimensional weaving or knitting methods known in the prior art related to the manufacture of socks, and a suitable pattern for use can be cut therefrom. Alternately, the textile material 137 forming at least a portion of the upper 23 can be made in the origami-like patterns taught in U.S. Pat. No. 5,604,997 granted to Dieter, and assigned to Nike, Inc. and the like, or the shoe construction taught in U.S. Pat. No. 6,237,251 granted to Litchfield et al. and assigned to Reebok International, Ltd., and the like, or the article of footware taught in U.S. Pat. No. 6,299,962 granted to Davis et al. also assigned to Reebok International, Ltd., and the like, all of these recited patents hereby being incorporated by reference herein.

As shown in FIG. 349, the textile material 137 can be impregnated or over-molded with a plastic material 138 forming a stability element 136d, e.g., a relatively rigid thermoplastic material such as nylon, polyester, or polyethylene, or alternatively, an elastomeric thermoplastic material such as those made by Advanced Elastomer Systems which have been previously recited, a foam thermoplastic material, a rubber material, or a polyurethane material, and the like. The textile material 137 can be impregnated or over-molded while positioned in a substantially planar two dimensional orientation as shown in U.S. Pat. No. 6,299,962 granted to Davis et al., or alternately, while positioned in a relatively complex three dimensional shape on a footware last 80, mold, or the like. For example, stability element 136d can be made of a thermoplastic material or a polyurethane material that is directly injection molded and bonded to the upper 23.

Alternately, a foam material can be applied to the upper 23 as taught in U.S. Pat. No. 5,785,909 granted to Chang et al. and U.S. Pat. No. 5,885,500 granted to Tawney et al., assigned to Nike, Inc., and the like, the recited patents hereby being incorporated by reference herein. The textile material 137 can possibly be impregnated or over-molded with the use of a spray, dipping, or roller application generally similar to that known in the screenprinting prior art. If the plastic material 138 is of the thermoplastic variety, it can then be caused to cool to take a set. Alternately, a thermoset material which is used to impregnate or over-mold the textile material 137 can be caused to cross-link by conventional means known in the prior art. It is also possible to use a thermoplastic material that is moldable when heated to a relatively low temperature, and a wearer can then put on the article of footware 22 and cause the upper 23 to be molded to a desired shape before the thermoplastic material

cools and sets. Moreover, as taught in the applicant's pending U.S. Ser. No. 09/570,171, filed May 11, 2000, light-cure materials which can be caused to set and cure upon exposure to a specific range of light frequency and wavelength having adequate power can also be used. When the inferior side 38 of the upper 23 includes a plurality of openings 72 for accommodating the passage of a plurality of traction members 115 associated with the anterior outsole element 44 therethrough, it can be advantageous that the inferior side 38 of the upper 23 in the forefoot area 58, and possibly also that the midfoot area 67 and rearfoot area 68 be impregnated or over-molded by plastic material 138, or a suitable alternate material, or that the inferior side 38 otherwise be reinforced to enhance its structural integrity.

The upper 23 can also be made of new thermoplastic materials which have not yet been used to make articles of footwear that are biodegradable and environmentally friendly. For example, textile materials made from polylactic acid polymers derived from corn or other vegetation known by the trade name NATUREWORKS® fibers are presently under development and being commercialized by Cargill Dow Polymers LLC of Minneapolis, Minn. in corporation with the Kanebo Corporation associated with the Itochu Corporation of Osaka, Japan. The physical and mechanical properties of fibers and thermoplastic materials derived from polylactic acid generally compare favorably with many existing fibers and thermoplastic materials, but unlike the vast majority of the synthetic fibers and thermoplastic materials presently being used in the manufacture of articles of footwear those derived from polylactic acid are capable of substantially biodegrading when buried in the soil for a period of two to three years.

FIG. 350 is a lateral side 36 view of a shoe upper 23 that is generally similar to that shown in FIG. 349. However, as shown in FIG. 350, the upper 23 is made in general accordance with the so-called Huarache style commercialized by Nike, Inc. The textile material 137 can have elastic qualities, or alternatively, a rubber, neoprene foam rubber, polyurethane, or other material can be used in those areas of the vamp 52 and quarters 119 in which the location of a textile material 137 is indicated. In this regard, the textile material 137, or alternately, a substitute material having substantial elastic characteristics extends into the collar area 122 in order to facilitate entry and exit of a wearer's foot. Moreover, it can be readily understood that the upper 23 can include removable quarters including openings 72 for accommodating laces, straps 118, and/or other conventional closure means. The synergistic use of a textile material 137 or an alternate material having substantial elongation or elastic characteristics in combination with a relatively rigid thermoplastic material 138 or an alternate material having substantially less elongation or elastic characteristics in making the upper 23 can be coordinated to create select areas having different known and desired elongation characteristics in order to suitably accommodate or compliment a wearer's anatomical characteristics and biomechanical motions when engaged in activity. See U.S. Pat. No. 5,377,430 and also U.S. Pat. No. 6,367,168 B1 granted to Hatfield et al., and assigned to Nike, Inc., these patents being hereby incorporated by reference herein.

FIG. 351 is a bottom plan view of an upper 23 generally similar to that shown in FIGS. 349. Shown are a plurality of openings 72 for accommodating a plurality of traction members 115 associated with an anterior outsole element 44 generally similar to that shown in FIG. 318. Also shown is a hexagon shaped opening 29 for accommodating the passage of a fastener 29, the inferior side of the tongue 127, and

the presence of a plastic material 138 or alternate wear resistant material on the inferior side 38 of the upper 23.

FIG. 352 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 338, but including a number of differences. In this alternate embodiment, the openings 72 in the upper 23 for accommodating the outsole 43 traction members 115 associated with the anterior outsole element 44 extend not only on the inferior side 38, but also upwards about a portion of the medial side 35, lateral side 36, and also a portion of the anterior side 33 of the upper 23. Again, a portion of the backing 30 of the anterior outsole element 44 can extend upwards within the interior of the upper 23 forming stability elements 136.1, 136.2, 136.3, and 136.5, and traction members 115 which are not confined to the inferior side 38 of the upper 23 can extend therethrough. The structure can be advantageous for use in articles of footwear intended for use in activities requiring substantial lateral movement.

FIG. 353 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 generally similar to that shown in FIG. 341, but including a number of differences. In this alternate embodiment, the openings 72 for accommodating the outsole 43 traction members 115 can extend not only on the inferior side 38, but also upwards about a portion of the medial side 35, lateral side 36, and also a portion of the anterior side 33 of the upper 23. Again, stability element 136c can form a plurality of individual stability elements 136.1c, 136.2c, 136.3c, and 136.5c that extend upwards about the exterior sides of the upper 23, and traction members 115 which are not confined to the inferior side 38 of the upper 23 can extend therethrough. The structure can be advantageous for use in articles of footwear intended for use in activities requiring substantial lateral movement. As shown, the traction members 115 can be affixed to the backing 30 of the anterior outsole element 44 and can emerge through registered openings 72 in the upper 23 and stability element 136c. Alternately, the traction members 115 can be directly affixed to a stability element generally similar to 136c which does not include openings 72. Again, the stability element 136c can be made of a transparent or translucent material as shown, or a thermoplastic material including decorative sublimation printing, and the like. The stability element 136c could have other configurations, and portions could possibly extend upwards to link with closure means such as laces or straps included in the construction of the upper 23. For example, an opening 72 is shown in the superior portion of stability element 136.3c and 136.2c for possible use with a lace or strap.

FIG. 354 is a bottom plan view of an upper 23 generally similar to that shown in FIG. 351, but including openings 72 for accommodating the traction members 115 of the anterior outsole element 44 which extend upwards about the medial side 35, lateral side, and a portion of the anterior side 33 similar to that shown in FIGS. 352 and 353.

FIG. 355 shows a lateral side view of an article of footwear 22 including a spring element 51 and closure means including three straps 118 which can be affixed with VELCRO® hook and pile 140.

FIG. 356 shows a lateral side view of an article of footwear 22 including a spring element 51 and closure means including a removable strap 118 including eyelets 139 for accommodating the use of laces. Portions of the strap 118 can pass under the inferior side 38 of the upper 23 and be at least partially mechanically affixed within the grooves or valleys 93 formed between adjacent traction members 115.

FIG. 357 shows a lateral side view of an article of footwear 22 including a spring element 51, a backtab pull or strap 118.1, another pull or strap 118.2 located on the superior side 37 of the upper 23, and closure means including a removable strap 118.3 including eyestays 139 for accommodating the use of laces. Alternately, the strap taught in U.S. Pat. No. 5,692,319 granted to Parker et al. and assigned to Nike, Inc. can possibly be used, this patent hereby being incorporated by reference herein. A portion of the strap 118.3 can pass about the posterior side 34 of the upper 23 and there be adjusted and removably affixed with the use of VELCRO® hook and pile 140, and also under the inferior side 38 of the upper 23 and there be at least partially mechanically affixed within the grooves or valleys 93 formed between adjacent traction members 115 as was shown in FIG. 356.

FIG. 358 is a top plan view of a pattern for an upper 23 of an article of footwear 22 that is substantially formed in a single part. As shown, the upper 23 includes a textile material 137 and can be cut using an automatic cutting machine such as those made by the Eastman Company of Buffalo, N.Y. As previously discussed, the upper 23 can also be coated or over-molded with a thermoplastic material 138 to create reinforced areas, and this can be done either before or after the desired pattern is cut. The inferior side 38 of the upper 23 can include openings 72 for the passage of traction members therethrough, or alternately, can have traction members 115 directly affixed thereto, as shown in FIG. 360. The inferior side 38 be folded underneath in order to properly communicate with the medial, lateral, anterior and posterior portions of the upper 23 and be affixed in functional relation thereto with the use of conventional means such as stitching, adhesives, bonding, or welding such as radio frequency or sonic welding, and the like. The provision of an overlap area 141.1 can facilitate affixing the posterior sides 34 of the upper 23 together. Likewise the provision of an overlap area 141.2 on the inferior side 38 can facilitate affixing that portion in functional relation to the other portions of the upper 23. The overlap areas 141.1 and 141.2 can pass and therefore be visible within the interior of the upper 23, or alternately, on the exterior of the upper 23.

FIG. 359 is a top plan view of an alternate pattern for an upper 23 of an article of footwear 22 that is substantially formed in a single part. In this embodiment, the inferior side 38 is formed in two discontinuous portions that are connected to the generally opposing medial and lateral sides of the upper 23. As shown the upper 23 pattern is made of a textile material 137. As previously discussed, the textile material 137 can possibly be partially coated or over-molded with a thermoplastic material 138.

FIG. 360 is a top plan view of an alternate pattern for an upper 23 of an article of footwear 22 that is substantially formed in two parts. This can sometimes be advantageous when a material or color break exists in the design of the upper 23. As shown, the portion including the posterior side 34 includes an overlap portion 141.1 for facilitating affixing the medial side 35 and lateral side 36 together, and also an overlap portion 141.3 for affixing that portion of the upper 23 including the posterior side 34 to that portion of the upper 23 including the anterior side 33. As shown, the upper 23 is substantially made of a thermoplastic material 138. Alternately, the upper 23 can be made of a textile material 137, or a textile material 137 that is partially coated or over-molded with a thermoplastic material 138. As shown, traction members 115 can be directly affixed or integrally molded to the inferior side 38 of the upper 23.

FIG. 361 is a bottom plan view of an upper 23 of an article of footwear 22 having an opening 72 in the rearfoot area 68. The opening 72 can permit a portion of a fluid-filled bladder 101, foam cushioning element 135, or other cushioning medium or cushioning means that is inserted within the upper 22 to protrude downwardly therethrough as shown, e.g., in FIGS. 331 and 334.

FIG. 362 is a top plan view of a posterior spring element 49 having an opening 72 in the rearfoot area 68. The opening

- 10 72 can permit a portion of a fluid-filled bladder 101, foam cushioning element 135, or other cushioning medium or cushioning means that is inserted within the upper 23 to be visible from the superior side 37, and to also possibly protrude upwardly therethrough.

15 FIG. 363 is a side perspective view of a posterior spring element 49 having a three dimensional shape including a relatively low profile cupped shape about the medial side 35, lateral side 36, and posterior side 34.

FIG. 364 is a side perspective view of a posterior spring element 49 having a three dimensional shape including a heel counter 24 having a relatively high profile about the medial side 35, lateral side 36, and posterior side 34.

FIG. 365 is a side perspective view of a posterior spring element 49 having a three dimensional shape including two generally opposing heel counters 24 having a relatively high profile on the medial side 35 and the lateral side 36, and a relatively low profile cupped shape about the posterior side 34.

FIG. 366 is a top plan view of an inferior spring element 50, and showing two arrows indicating a position associated with a width measurement between the medial side 35 and lateral side 36, and also a position associated with a length measurement between the approximate center of the opening 72 for accommodating a fastener 29 and the posterior side 34.

FIG. 367 is a top plan view of an inferior spring element 50 showing a flexural axis 59 oriented at approximately 35 degrees from the transverse axis 91 for possible use by a wearer.

40 FIG. 368 is a top plan view of an inferior spring element 50 showing a flexural axis 59 oriented at approximately 45 degrees from the transverse axis 91 for possible use by a wearer.

FIG. 369 is a top plan view of an inferior spring element 50 showing a flexural axis 59 oriented at approximately 25 degrees from the transverse axis 91 for possible use by a wearer.

FIG. 370 is a top plan view of an inferior spring element 50 showing a flexural axis 59 oriented at approximately 90 degrees from the longitudinal axis 67, thus generally consistent with the transverse axis 91.

FIG. 371 is a side view of an inferior spring element 50 affixed in functional relation to an article of footwear 22 showing possible deflection of the inferior spring element 50 with an arrow.

FIG. 372 is a side view of a portion of an inferior spring element 50 showing the thickness of the inferior spring element 50 with an arrow.

FIG. 373 is a side perspective view of an inferior spring element 50 having an asymmetrical curvature on the medial side 35 versus the lateral side 36. Again, the flexural axis 59 can be orientated at approximately 90 degrees from the longitudinal axis 67, thus generally consistent with the transverse axis 91, or alternately can be orientated at an angle deviated therefrom.

FIG. 374 is a side perspective view of an inferior spring element 50 having a symmetrical curvature on the medial

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side 35 and the lateral side 36. Again, the flexural axis 59 can be orientated at approximately 90 degrees from the longitudinal axis 67, thus generally consistent with the transverse axis 91, or alternately can be orientated at an angle deviated therefrom.

FIG. 375 is a bottom plan view of a posterior outsole element 46 mounted on an inferior spring element 50 showing a position associated with a width measurement and a position associated with a length measurement for possible use in an Internet Website or retail establishment.

FIG. 376 is a bottom plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 35 degrees from the transverse axis similar to that shown in FIG. 367.

FIG. 377 is a bottom plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 45 degrees from the transverse axis 91 similar to that shown in FIG. 368.

FIG. 378 is a bottom plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 25 degrees from the transverse axis 91 similar to that shown in FIG. 369.

FIG. 379 is a bottom plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 90 degrees from the transverse axis 91 similar to that shown in FIG. 370.

FIG. 380 is a top plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 35 degrees from the transverse axis 91 similar to that shown in FIG. 367. As shown, the backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 381 is a top plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 45 degrees from the transverse axis 91 similar to that shown in FIG. 368. As shown, the backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 382 is a top plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 25 degrees from the transverse axis 91 similar to that shown in FIG. 369. As shown, the backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 383 is a top plan view of a posterior outsole element 46 mounted on an inferior spring element 50 having a flexural axis 59 oriented at approximately 90 degrees from the transverse axis 91 similar to that shown in FIG. 370. As shown, the backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 384 is a top plan view of a posterior outsole element 46 including an opening 72 for accommodating a fluid-filled bladder 101. A fluid-filled bladder 101 can be inserted into the pocket 131 within the posterior outsole element 46. A portion of the fluid-filled bladder 101 can then project through the opening 72 in the backing 30, but the fluid-filled bladder 101 can be prevented from passing completely therethrough due to the inclusion of an integral generally planar flange 124.

FIG. 385 is a top plan view of a posterior outsole element 46 including an opening 72 for accommodating a foam cushioning element 135. A foam cushioning element 135 can be inserted into the pocket 131 within the posterior

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outsole element 46. A portion of the foam cushioning element 135 can then project through the opening 72 in the backing 30, but the foam cushioning element 135 can be prevented from passing completely therethrough due to the inclusion of an integral generally planar flange 124.

FIG. 386 is a top plan view of a posterior outsole element 46 including a plurality of openings 72 for accommodating a fluid-filled bladder 101 including three chambers 133. A fluid-filled bladder 101 can be inserted into the pocket 131 within the posterior outsole element 46. A portion of the fluid-filled bladder 101 can then project through the openings 72 in the backing 30, but the fluid-filled bladder 101 can be prevented from passing completely therethrough due to the inclusion of an integral generally planar flange 124. As shown, the fluid-filled bladder 101 can be positioned on the medial side 35 in order to increase the local stiffness in compression and thereby reduce exhibited pronation. Again, the backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 387 is a top plan view of a posterior outsole element 46 including a plurality of openings 72 for accommodating a foam cushioning element 135 including three columns. A foam cushioning element 135 can be inserted into the pocket 131 within the posterior outsole element 46. A portion of the three columns of the foam cushioning element 135 can then project through the openings 72 in the backing 30, but the foam cushioning element 135 can be prevented from passing completely therethrough due to the inclusion of an integral generally planar flange 124. As shown, the foam cushioning element 135 can be positioned on the medial side 35 in order to increase the local stiffness in compression and thereby reduce exhibited pronation. Again, the backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 388 is a top plan view of a posterior outsole element 46 including a plurality of openings 72 for accommodating a fluid-filled bladder 101 including three chambers 133. A fluid-filled bladder 101 can be inserted into the pocket 131 within the posterior outsole element 46. A portion of the fluid-filled bladder 101 can then project through the openings 72 in the backing 30, but the fluid-filled bladder 101 can be prevented from passing completely therethrough due to the inclusion of an integral generally planar flange 124. As shown, the fluid-filled bladder 101 can include a first chamber 133 positioned on the medial side 35, a second chamber 133 on the lateral side 36, and a third chamber 133 on the posterior side 34 in order to increase the local stiffness in compression. Again, the backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 389 is a top plan view of a posterior outsole element 46 including a plurality of openings 72 for accommodating a foam cushioning element 135 including three generally oval shaped portions. A foam cushioning element 135 can be inserted into the pocket 131 within the posterior outsole element 46. A portion of the three oval shaped portions of the foam cushioning element 135 can then project through the openings 72 in the backing 30, but the foam cushioning element 135 can be prevented from passing completely therethrough due to the inclusion of an integral generally planar flange 124. As shown, the foam cushioning element 135 can include a first oval shaped portion on the medial side 35, a second oval shaped portion on the lateral side 36, and a third oval shaped portion on the posterior side 34 in order to increase the local stiffness in compression. Again,

backing 30 portion of the posterior outsole element 46 can be made of a transparent material, thus enabling the inferior spring element 50 to be visible.

FIG. 390 is a bottom plan view of a posterior outsole element 46 including a plurality of traction members 115 for possible use on natural surfaces.

FIG. 391 is a bottom plan view of an anterior outsole element 44 including a plurality of traction members 115 for possible use on natural surfaces.

FIG. 392 is a side view of an article of footwear 22 including a posterior outsole element 46 and also an anterior outsole element 44 including a plurality of traction members 115 generally similar to those shown in FIGS. 390-391.

FIG. 393 is a side view of an article of footwear 22 including a posterior outsole element 46 and also an anterior outsole element 44 including a plurality of traction members 115 having greater height than those shown in FIGS. 390-392.

FIG. 394 is a bottom plan view of an anterior spring element 48 without flex notches, but including a portion of a prior art bicycle cleat system 73 affixed thereto. Shown is a portion of the prior art bicycle cleat system taught in U.S. Pat. No. 5,546,829 granted to Richard Byrne and assigned to Speedplay, Inc. of San Diego, Calif., and in particular, the embodiment shown in FIG. 19 therein, this patent hereby being incorporated by reference herein. The numerals used in U.S. Pat. No. 5,546,829 to indicate various portions of this prior art bicycle cleat system have been retained for possible reference.

FIG. 395 is a top plan view of an anterior spring element 48 generally similar to that shown in FIG. 316, but having a slightly different configuration. A portion of at least one flex notch 71 can simultaneously serve as a female mating structure 129 for use in combination with a mate mating structure 130, or alternately, as an opening for accommodating the passage of a portion of at least one fastener 29.

FIG. 396 is a top plan view of an anterior spring element 48 generally similar to that shown in FIG. 316, but including a greater number of flex notches 71. In particular, the position of some of the flex notches have been changed, and this embodiment further includes longitudinal flex notches 71.8 and 71.9, and also a transverse flex notch 71.7. This embodiment can exhibit relatively less torsional stiffness when loads are expected to be applied from a greater number of directions.

FIG. 397 is a top plan view of an inferior anterior spring element 48.2 including a longitudinal flex notch 71.1, and transverse flex notches 71.2, 71.3, 71.5, and 71.6. These notches can be associated with lines of flexion 54.1, 54.2, 54.3, 54.5, and 54.6.

FIG. 398 is a top plan view of an inferior anterior spring element 48.2 including three longitudinal flex notches 71.1, 71.8, and 71.9. A portion of at least one flex notch 71 can simultaneously serve as a female mating structure 129 for use in combination with a mate mating structure 130, or alternately, as an opening for accommodating the passage of a portion of at least one fastener 29.

FIG. 399 is a top plan view of an anterior spacer 55.2 for use between an anterior spring element 48.1 and an inferior anterior spring element 48.2 similar to that shown in FIG. 342. The anterior spacer 55.2 includes a recess 84.3 for accommodating a portion of an anterior outsole element 44, and also three openings 72 for accommodating the passage of a portion of three fasteners 29 therethrough.

FIG. 400 is a cross-sectional view taken along line 400-400 of the anterior spacer 55.2 shown in FIG. 399 having a generally planar configuration. The thickness of an

anterior spacer 55.2 can be selected from a number of available options in order to provide a specific amount of deflection and desired cushioning and stability characteristics.

- 5 FIG. 401 is a cross-sectional view taken along a line similar to line 400-400 shown in FIG. 399 of an alternate anterior spacer 55.2 having an inclined configuration. The relative amount of possible deflection on the medial side 35 versus the lateral side 36 can be determined by using an anterior spacer 55.2 having an inclined configuration. An anterior spacer 55.2 having an inclined configuration can also be used in order to compensate for a wearer having a varus or valgus condition, or otherwise improve the overall cushioning and stability characteristics for an individual wearer. As shown, an anterior spacer 55.2 can have an inclined configuration having greater height on the lateral side 36, or alternately on the medial side 35, or have another different oblique configuration.

FIG. 402 is a top plan view of an inferior anterior spring element 48.2 generally similar to that shown in FIG. 397 which is at least partially positioned below an anterior spacer 55.2 generally similar to that shown in FIG. 399, and the inferior anterior spring element 48.2 is also at least partially contained within an anterior outsole element 44. The inferior anterior spring element 48.2 can be inserted into a pocket 131 formed within a portion of the anterior outsole element 44 near the posterior side 34, whereas the anterior spacer 55.2 can be inserted near the anterior side 33, and a portion of the anterior outsole element 44 can be fitted and inserted into the recess 84.3 therein. At least one fastener 29 can be inserted through openings 72 thereby affixing the components in functional relation to an article of footwear 22.

- 20 FIG. 403 is a top plan view of an inferior anterior spring element 48.2 generally similar to that shown in FIG. 398 substantially positioned within an anterior outsole element 44. The inferior anterior spring element 48.2 can be inserted into a pocket 131 formed within the anterior outsole element 44 from the anterior side 33. As shown, the backing 30 portion of the anterior outsole element 44 can be made of a transparent material, thus enabling the inferior anterior

30 component in functional relation to an article of footwear 22.

- 35 FIG. 404 is a top plan view of an inferior anterior spring element 48.2 generally similar to that shown in FIG. 397 substantially positioned within an anterior outsole element 44. The inferior anterior spring element 48.2 can be inserted into a pocket 131 formed within the anterior outsole element 44 from the anterior side 33. As shown, the backing 30 portion of the anterior outsole element 44 can be made of a transparent material, thus enabling the inferior anterior

40 component in functional relation to an article of footwear 22.

- 45 FIG. 405 is a bottom plan view of an inferior anterior spring element 48.2 generally similar to that shown in FIG. 397 substantially positioned within an anterior outsole element 44 showing a plurality of traction members 115 on the ground engaging portion 53 of the outsole 43. As shown, the backing 30 portion of the anterior outsole element 44 can be made of a transparent material, thus enabling the inferior anterior

50 component in functional relation to an article of footwear 22.

- 55 FIG. 406 is a top plan view of an alternate anterior spacer 55.2 for use between an anterior spring element 48.1 and an inferior spring element 48.2. This alternate anterior spacer 55.2 includes a opening 72 to a pocket 131 on the posterior side 34 for receiving the anterior side of an inferior spring element 48.2.

FIG. 407 is a posterior side view of the anterior spacer 55.2 shown in FIG. 406 for use between an anterior spring element 48.1 and an inferior anterior spring element 48.2. As shown, it can be advantageous to use a relatively hard thermoplastic material on the superior side 37 and encompassing the pocket 131 for receiving the inferior anterior spring element 48.2, whereas a relatively soft thermoplastic material or thermoset material having good cushioning characteristics can be used on the inferior side 38 and form traction members 115 thereupon.

FIG. 408 is an anterior side 33 view of the anterior spacer 55.2 shown in FIG. 406 for use between an anterior spring element 48.1 and an inferior anterior spring element 48.2.

FIG. 409 is a cross-sectional side view taken along line 409—409 of the anterior spacer 55.2 shown in FIG. 406 for use between an anterior spring element 48.1 and an inferior anterior spring element 48.2. Again, it can be advantageous to use a relatively hard thermoplastic material on the superior side 37 and encompassing the pocket 131 for receiving the inferior anterior spring element 48.2, whereas a relatively soft thermoplastic material or thermoset material having good cushioning characteristics can be used on the inferior side 38 and form traction members 115 thereupon.

FIG. 410 is a bottom plan view of an inferior anterior spring element 48.2 positioned within the anterior outsole element 44 shown in FIG. 405, but also within the anterior spacer 55.2 shown in FIGS. 406–409. The anterior outsole element 44, anterior spacer 55.2 and inferior anterior spring element 48.2 can be further affixed and secured in functional relation to an article of footwear 22 with the use of at least one fastener 29 which can pass through at least one registered opening 72 near the anterior side 33 of the associated components.

FIG. 411 is a bottom plan view of the anterior spacer 55.2 shown in FIGS. 406–410, and also a plurality of fasteners 29 having a semi-oval shape.

FIG. 412 is a cross-sectional side view generally similar to that shown in FIG. 344 showing the inferior anterior spring element 48.2, anterior spacer 55.2, and anterior outsole element 44 shown in FIGS. 404–411, and also showing in phantom the relative position of an upper 23 with the use of dashed lines. The angle and orientation of the pocket 131 included in the anterior spacer 55.2 can be selected from a variety of options for at least partially determining the amount of possible deflection and orientation of the anterior spring element 48.2. Further, the configuration of the inferior anterior spring element 48.2 and associated anterior outsole element 44 can be selected from a variety of options for partially determining the amount of possible deflection and orientation of the anterior spring element 48.2.

Moreover, the configuration and material composition of a posterior outsole element 46, middle outsole element 45, and anterior outsole element 44 can be selected from a variety of options which can be provided for optimizing performance in a specific activity, task, or in particular environmental conditions. For example, the outsole elements can be specifically designed and engineered for use in running on roads, trails, racing, walking, or cross-training. An outsole element for trail running can include a greater number of traction members having greater height relative to one best suited for running on roads, whereas it can be advantageous for an outsole element intended for use in racing to be especially light-weight. Further, an outsole element intended for use on an artificial track surface can include a plurality of relatively small protrusions or spikes. Outsole elements which are made of non-marking materials

can be provided that are especially suitable for use in basketball, whereas outsole elements including natural rubber, and the like, can be provided that are especially suitable for use in volleyball. Material compounds which are especially resistant to wear can be provided for use in tennis. Outsole elements including a plurality of cleats, protrusions, or traction elements can be specifically designed and engineered for use in baseball, football, golf, and soccer, respectively. As shown in FIG. 394, an outsole element can accommodate the use of a bicycle cleat system. Outsole elements made of material compositions which are resistant to oil and other chemicals can be provided that are especially suitable for use in articles of footwear intended for work and industrial use.

FIG. 413 is a top plan view of an inferior anterior spring element 48.2 positioned within an anterior outsole element 44 having a backing 30 including a plurality of resilient semi-circular domes 143. Accordingly, it can be readily understood that the backing 30 can be configured to provide integral cushioning means between the superior side of the inferior anterior spring element 48.2 and the inferior side of the anterior spring element 48.1.

FIG. 414 is a top plan view of an inferior anterior spring element 48.2 positioned within an anterior outsole element 44 having a backing 30. The backing 30 further includes a plurality of foam cushioning elements 135 affixed thereto. Accordingly, the foam cushioning elements 135 can provide cushioning means between the superior side of the inferior anterior spring element 48.2 and the inferior side of the anterior spring element 48.1.

FIG. 415 is a top plan view of an inferior anterior spring element 48.2 positioned within an anterior outsole element 44 having a backing 30. The backing 30 can include an opening 72 for permitting a portion of a foam cushioning element 135 to project therethrough. As shown, the foam cushioning element 135 includes five columns which are made as a single integral component. Alternately, the column portions can be affixed to a thin web 114 having a generally planar configuration. In any case, the foam cushioning element 135 can include a flange 124 for retaining the columns in position. It can be readily understood that a foam cushioning element 135 can be made in a multiplicity of different configurations and shapes.

FIG. 416 is a top plan view of an inferior anterior spring element 48.2 positioned within an anterior outsole element 44 having a backing 30 including a plurality of openings 72 for permitting the projection of at least a portion of at least one fluid-filled bladder 101 therethrough. Alternately, the chambers 133 can be formed individually and be affixed in a desired configuration to a thin web 114 having a generally planar configuration. As shown, the fluid-filled bladder 101 includes three chambers 133 that are in fluid communication and form an integral component. Alternately, at least one fluid-filled bladder including valves that can serve as a motion control device can be used, as taught in WO 01/70061 A2 entitled "Article of Footwear With A Motion Control Device, by John F. Swigart and assigned to Nike, Inc. Moreover, at least one fluid-filled bladder that forms part of a larger dynamically-controlled cushioning system can be used, as taught in WO 01/78539 A2 and U.S. Pat. No. 6,430,843 B1 entitled "Dynamically-Controlled Cushioning System For An Article of Footwear," by Daniel R. Potter and Allan M. Schrock, and assigned to Nike, Inc. Such an article of footwear can include at least one fluid-filled bladder including a plurality of chambers, a control system possibly including a CPU, a pressure detector, and a regulator for modulating the level of fluid communication between dif-

ferent fluid-filled bladders or chambers. Again, the patent applications recited in this paragraph have been previously incorporated by reference herein. In any case, the fluid-filled bladder 101 can include a flange 124 for retaining the chambers 133 in relative position, as shown in FIG. 416. It can be readily understood that a fluid-filled bladder 101 can be made in a multiplicity of different configurations and shapes.

FIG. 417 is a side view of an article of footwear 22 including a middle outsole element 45.

FIG. 418 is a side view of an article of footwear 22 including a middle outsole element 45 substantially consisting of fluid-filled bladder 101. As shown, the middle outsole element 45 substantially consists of fluid-filled bladder 101 can include a wall 132 and a chamber 133, and be made of a material that is substantially transparent.

FIG. 419 is a side exploded view of an article of footwear 22 including the middle outsole element 45 substantially consisting of the fluid-filled bladder 101 shown in FIG. 418. The posterior outsole element 46 is shown in position on the inferior spring element 50, whereas the middle outsole element 45, and the female portion 86 of a fastener 29 are shown separated. Accordingly, the middle outsole element 45 can be selectively removed and replaced, as desired.

FIG. 420 is a side view of an article of footwear 22 including a middle outsole element 45 substantially consisting of a foam cushioning element 135. As shown, the foam cushioning element 135 can include dual density material, that is, a relatively soft material near the superior side, but a relatively hard wear resistant material or skin near the inferior side and ground engaging portion 53 of the outsole 43.

FIG. 421 is a bottom plan view of the article of footwear 22 including a middle outsole element 45 substantially consisting of a fluid-filled bladder 101 shown in FIG. 418.

FIG. 422 is a bottom plan view of the article of footwear 22 including a middle outsole element 45 substantially consisting of a foam cushioning element 135 shown in FIG. 420.

FIG. 423 is a side view of a footwear last 80 showing the superior side 37, inferior side 38, anterior side 33, posterior side 34, heel elevation 145, a tread point 144, and toe spring 62. The amount of toe spring 62 incorporated into a footwear last 80 or other three dimensional rendering of a footwear configuration is commonly measured with the inferior side 38 of the area of the last 80 corresponding to the approximate position of the weight bearing center of a hypothetical wearer's heel being elevated such that the inferior side 38 of the rearfoot area 58 is approximately parallel to an underlying generally planar support surface. When so treaded a last 80, the forefoot area of the last 80 will make contact at a position that is commonly called the tread point 144. It is common for the heel elevation 145 of a treaded last 80 to be in the range between 10-12 mm. When represented in 1/1 scale, the amount of toe spring 62 should measure approximately 20 mm.

FIG. 424 is a side view of a footwear last 80 with parts broken away showing toe spring 62 that would measure approximately 10 mm when represented in 1/1 scale.

FIG. 425 is a side view of a footwear last 80 with parts broken away showing toe spring 62 that would measure approximately 30 mm when represented in 1/1 scale. It can be advantageous to incorporate at least 10 mm of toe spring 62 into an article of footwear intended for running, but even 30 mm of toe spring 62 can sometimes be incorporated into track spikes intended for athletes running at high speeds.

FIG. 426 is a side view of an upper 23 including a removable strap 118.3 including openings 72 for accommodating lace 121 closure means. Again, the strap 118.3 can be selectively removed and replaced, and secured between an inferior spring element 50 and the upper 23 with the use of a fastener 29.

FIG. 427 is a side view of an upper 23 including a removable strap 118.3 including openings 72 for accommodating lace 121 closure means and also a strap portion 10 encompassing the posterior side 34 of the upper 23 including VELCRO® hook and pile 140 closure means.

FIG. 428 is a side view of an upper 23 including a removable strap 118.3 including VELCRO® hook and pile 140 closure means.

FIG. 429 is a side view of an upper 23 including a removable strap 118.3 including VELCRO® hook and pile 140 closure means, and also a strap portion encompassing the posterior side of the upper 23 including VELCRO® hook and pile 140 closure means.

FIG. 430 is a side view of an upper 23 including a removable strap 118.3 including openings 72 for accommodating lace 121 closure means and also a strap portion encompassing the posterior side 34 of the upper 23 including VELCRO® hook and pile 140 closure means.

FIG. 431 is a bottom plan view showing a superior spring element 47 including a posterior spring element 49 and an anterior spring element 48 including a plurality of flex notches 71 generally similar to that shown in FIG. 316 positioned in functional relation within an upper 23, and showing a plurality of fasteners 29 for selectively adjusting the width and girth of the upper 23. Again, as discussed previously in connection with FIGS. 30-34, the inferior side 38 of the upper 23 can include a T-sock 56 made of a textile material 137 or other material having resilient elastic, stretch, or elongation physical properties and mechanical characteristics, and the relative position of various portions of the upper 23 can be adjusted and secured at a plurality of positions with the use of fasteners 29, as desired. Alternately, the inferior side 38 of the upper 23 can be made of a textile material 137 or other material which is also used on the superior side of the upper 23 having resilient elastic, stretch, or elongation physical properties and mechanical characteristics, and the relative position of various portions of the upper 23 can be adjusted and secured at a plurality of positions with the use of fasteners 29, as desired.

As shown, the fasteners 29 can be inserted through openings 72 in the inferior side of the upper 23 that also register with the longitudinal and transverse flex notches 71 associated with the anterior spring element 48. Accordingly, a given fastener 29 which is affixed to a portion of the inferior side 34 of the upper 23 can then simply be drawn inwards or outwards along the path of the corresponding longitudinal or transverse flex notch 71, and the upper 23 can then secured in a desired position.

FIG. 432 is a bottom plan view of an anterior outsole element 44 including a hexagonal opening 72 for accommodating a fastener 29. As shown, the backing 30 portion of the anterior outsole element 44 can be made of a transparent material. When protrusions 99 which constitute male mating structures 128 are included on the superior side 37 of the backing 30 for the purpose of mechanically engaging with an overlying anterior spring element 44, these male mating structures 128 can then be visible from the inferior side 38. In FIG. 432, the location of a length measurement that is taken between the center of opening 72 and the anterior side 33, and also the location of a transverse width measurement that extends along line 104 between the medial side 35 and

the lateral side 36 of the anterior outsole element 44. The location of a transverse width measurement that extends along line 104 between the medial side 35 and the lateral side 36 of the anterior outsole element 44. The location of a transverse width measurement that extends along line 104 between the medial side 35 and the lateral side 36 of the anterior outsole element 44.

lateral side 36 is also shown for possible use in an Internet website or a retail establishment.

FIG. 433 is a bottom plan view of an anterior outsole element 44 generally similar to that shown in FIG. 432, but instead having a triangular opening 72 for accommodating a fastener 29, and also having a different configuration near the posterior side 34. Further, the anterior outsole element 44 shown in FIG. 433 has a different overall configuration or last shape than the embodiment shown in FIG. 432, and also a different length size and width size. It can be readily understood that a specific anterior outsole element 44 having a backing 30 and possibly further including a stability element 136 can be selected for use from amongst a wide variety and range of different provided options. However, the configuration and pattern of the outsole 43 traction members 115 shown in FIG. 433 could not be used with the same upper 23 as that used in combination with the embodiment of the anterior outsole element 44 shown in FIG. 432. Again, an anterior outsole element 44 having a backing 30 and possibly further including a stability element 136 can at least in part define the length size, width size, and configuration or last shape of an article of footwear 22 when inserted into an upper 23 including a textile material or other material having substantial elastic, stretch, or elongation physical properties and mechanical characteristics in at least a portion of the forefoot area 58.

FIG. 434 is a bottom plan view of an anterior outsole element 44 generally similar to that shown in FIG. 432, but further including a plurality of flex notches 71 for enhancing flexibility. Further, the embodiment shown in FIG. 434 also includes a backing 30 that extends more substantially about the sides of the anterior outsole element 44 which is made of a thermoplastic material having a relatively low softening and melting point relative to the material used to make the outsole 43 traction members 115. Accordingly, the anterior outsole element 44 can be heated to a temperature associated with the softening point of the thermoplastic material used to make the backing 30, and the backing 30 and anterior outsole element 44 can then be easily molded to a desired shape with the application of direct pressure. In this regard, a vacuum forming apparatus and method can be used. For example, various alternate metal last shapes and sizes can be provided which can be heated by an apparatus to a desired temperature, and these metal last shapes can also include a plurality of vacuum ports for effectively drawing and molding the backing 30 of an anterior outsole element 44 to a selected and desired shape. The backing 30 portion can also be cut to a desired shape, and the opening 72 for accommodating a fastener 29 can also be made in a selected position which will determine at least in part the resulting length size of an article of footwear 22. In this way, a single embodiment of an anterior outsole element 44 can be readily adapted for use to make one of several different possible length sizes, width sizes, and last shapes, as desired.

FIG. 435 is a bottom plan view of an anterior outsole element 44 generally similar to that shown in FIG. 433, but further including a plurality of flex notches 71 for enhancing flexibility. Further, the anterior outsole element 44 shown in FIG. 435 has a different overall configuration or last shape than the embodiment shown in FIG. 434, and also a different length size and width size. It can be readily understood that a specific anterior outsole element 44 having a backing 30 and possibly further including a stability element 136 can be selected for use from amongst a wide variety and range of different provided options. In contrast with the anterior outsole element 44 embodiment shown in FIG. 433, the configuration and pattern of the outsole 43 traction members

115 shown in FIG. 435 could possibly be used with the same upper 23 as that used in combination with the embodiments of the anterior outsole element 44 shown in FIGS. 432 and 434. Again, an anterior outsole element 44 having a backing 30 and possibly further including a stability element 136 can at least in part define the length size, width size, and configuration or last shape of an article of footwear 22 when inserted into an upper 23 including a textile material or other material having substantial elastic, stretch, or elongation physical properties and mechanical characteristics in at least a portion of the forefoot area 58.

FIG. 436 is a bottom plan view of an anterior outsole element 44 including a backing 30 portion which can extend substantially full length between the anterior side 33 and the posterior side 34 of a corresponding upper 23 of an article of footwear 22.

FIG. 437 is a bottom plan view of a gasket 142 for possible use between an anterior outsole element 44 and an upper 23. The gasket 142 can slip over a plurality of traction members 115 and be affixed to the relatively thin flange or backing 30 portion of an anterior outsole element 44. Accordingly, the gasket 142 can serve both to seal and affix the anterior outsole element 44 in functional relation to the upper 23. The gasket 142 can consist of a thin layer of double sided adhesive tape having protective peel-ply layers, or alternately a material having more substantial thickness such as a closed cell foam material including double sided adhesive surfaces having protective peel-ply layers. Accordingly, a gasket 142 can further include a self-adhesive surface 83 on both its superior side 37 and inferior side 38 that can be exposed by the removal of peel-ply layers 149. As shown, the peel-ply layer 149 on the inferior side 38 has already been removed.

FIG. 438 is a side view of an anterior outsole element 44 having a generally planar configuration.

FIG. 439 is a side view of an anterior outsole element 44 including an elevated stability element 136 having a three dimensional wrap configuration. This configuration can be advantageous for use in articles of footwear 22 intended for use in sports or activities requiring substantial lateral movement.

FIG. 440 is a bottom plan view of an anterior outsole element 44 generally similar to that shown in FIG. 439. As shown, the outsole 43 including traction members 115 extends beyond the perimeter of the backing 30 portion of the anterior outsole element 44 on the medial side 35, lateral side 36 and anterior side 33.

FIG. 441 is a top plan view of an insole 31 showing arrows indicating approximate positions of width and length measurements.

FIG. 442 is a top plan view of an insole 31 having a substantially planar forefoot area 58.

FIG. 443 is a top plan view of an insole 31 made of light-weight foam material 134 including a brushed cover layer made of a textile material 137.

FIG. 444 is a top plan view of an insole 31 made of an elastomeric material 146 having substantial dampening characteristics including a relatively smooth cover layer made of a textile material 137.

FIG. 445 is a top plan view of the insole 31 shown in FIG. 444 further including a custom moldable bladder 147 including a light cure material 148.

FIG. 446 is a bottom plan view of the insole 31 shown in FIG. 444 further including a custom moldable bladder 147 including a light cure material 148.

FIG. 447 is a top plan view of an insole 31 having a three dimensional wrap configuration in the forefoot area 58.

FIG. 448 is a cross-sectional side view of an insole 31 having a three dimensional wrap configuration in the forefoot area 58, midfoot area 67, and rearfoot area 68. This configuration can be advantageous for use when an anterior outsole element 44 further including a stability element 136 and three dimensional wrap configuration in the forefoot area 58 is desired for use.

FIG. 449 is a top plan view of an insole 31 having an opening 72 in the rearfoot area 68. This configuration of an insole 31 can possibly be used with an upper 23 generally similar to that shown in FIG. 361, and also possibly a posterior spring element 49 generally similar to that shown in FIG. 362.

FIG. 450 is a longitudinal cross-sectional side view of an article of footwear 22 including a bladder 101, and a superior spring element 47 and an inferior spring element 50 that are made as a single integral part. The superior side of the superior spring element 47 and that of a portion of the bladder 101 can be affixed by adhesive, chemical bonding, or other conventional means to the inferior side of the upper 23 as shown, or alternately to an intermediate material which is to be affixed to the upper, e.g., a midsole made of foam material. The bladder 101 can be formed by injection molding, blow-molding, and the like, and can include an opening 72 in a portion of the anterior side and superior side for permitting a portion of the spring element 51 to be inserted and contained therein. Alternately, the bladder 101 can be formed by using a shrink-wrap thermoplastic material. In this case, a portion of the spring element 51 can be inserted into a oversized bladder 101 component, and the application of heat can cause the bladder 101 shrink and substantially mold to the shape defined by the outer surfaces of the portion of the spring element 51 contained therein. As shown, a portion of the superior side of the superior spring element 47 can extend posterior of the inferior and posterior side of the upper 23 forming a generally planar configuration.

FIG. 451 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 450 including a bladder 101, and a superior spring element 47 and an inferior spring element 50 that are made separately, but later affixed together permanently to form a single integral part. The superior spring element 47 and inferior spring element 50 can be affixed by adhesives, chemical bonding, or other conventional means.

FIG. 452 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 451 including a bladder 101, but also a selectively removable and replaceable inferior spring element 50. The inferior spring element 50, bladder 101, and posterior outsole element 46 can be selectively removed and replaced with the use of a fastener 29. As shown, the article of footwear 22 can include an internal heel counter 24, or alternately, an external heel counter. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

FIG. 453 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 450 including a bladder 101, and a superior spring element 47 and an inferior spring element 50 that are made as a single integral part. However, in contrast with the embodiment shown in FIG. 450, a portion of the superior side of the superior spring element 47 extends about the posterior side of the upper 23 forming a generally curved configuration.

FIG. 454 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG.

452 including a bladder 101, but also a selectively removable and replaceable inferior spring element 50. The inferior spring element 50, bladder 101, and posterior outsole element 46 can be selectively removed and replaced with the use of a fastener 29. However, in contrast with the embodiment shown in FIG. 452, a portion of the superior side of the superior spring element 47 extends about the posterior side of the upper 23 forming a generally curved configuration. As shown, the article of footwear 22 can include an internal heel counter 24, or alternately, an external heel counter. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

FIG. 455 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 453 including a superior spring element 47 and an inferior spring element 50 that are made as a single integral part. However, the embodiment shown in FIG. 455 does not include a bladder 101.

FIG. 456 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 455. However, the embodiment shown in FIG. 456 includes a superior spring element 47 and an inferior spring element 50 that are made separately, and later bonded together to form a single integral part. Further, the superior spring element 47 can form an external heel counter 24, as shown.

FIG. 457 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 454 including a selectively removable and replaceable inferior spring element 50, and posterior outsole element 46. However, the embodiment shown in FIG. 457 does not include a bladder 101, rather the superior spring element 47 forms an external heel counter 24. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

FIG. 458 is a medial side view of an upper 23 of an article of footwear 22 including a strap 118.3 and a retainer 123 on the superior side 37. The strap 118.3 includes an opening 72 on the inferior side 38 for the passage of a fastener 29 therethrough, and can be selectively removed and replaced, as desired. The strap 118.3 can pass through an opening or slot in the retainer 123 on the superior side 37, and thereby be held in position. The retainer 123 can also include a strap 118.2 forming a loop that can serve as a pull for facilitating entry and exit of a wearer's foot with respect to the shoe upper 23. Also shown is a strap 118.1 on the posterior side 30 forming a loop that can serve as a pull for facilitating entry and exit of a wearer's foot with respect to the shoe upper 23. The upper 23 can be made using one or more textile materials, and a multiplicity of patterns and styles are possible. When the upper 23 is made of a stretch material or a substantially elastic material, or one that otherwise has substantial elongation characteristics, the geometry and shape of the upper 23 can be substantially defined by the insertion of a superior spring element 47 possibly including an anatomically shaped heel counter 24, and also an anterior outsole element 46 including a stability element 136, as shown in FIG. 352. Alternately, when the upper 23 is made of a stretch material or a substantially elastic material, or one that otherwise has substantial elongation characteristics, the geometry and shape of the upper 23 can be substantially defined by affixing a superior spring element 47 including an anatomically shaped heel counter 24 and also an anterior outsole element 46 including a stability element 136 to the

external side of the upper 23, as shown in FIG. 353. Accordingly, a relatively simple design and pattern can then be used to make an upper 23, and in particular, one that can be cut using automatic cutting machines, and also substantially sewn using automatic sewing machines, thus minimizing the cost of human labor and errors in making the upper 23. One maker and distributor of automatic sewing machines and associated technology is Schroeder Sewing Technologies of San Marcos, Calif. The aforementioned structures and methods can make it economically feasible to manufacture the upper 23 and associated article of footwear 22 in the particular host country of intended distribution such as the United States, that is, instead of making articles of footwear in Asia due to the presence of relatively inexpensive human labor costs there, as is present widespread practice throughout the footwear industry.

FIG. 459 is a lateral side 36 view of the upper 23 of the article of footwear 22 shown in FIG. 458. The portion of strap 118.3 which passes from the medial side 35 through the retainer 123 on the superior side 37 can be attached to a D-ring 150, and the portion of the strap 118.3 that extends upwards on the lateral side 36 can include male and female VELCRO® hook and pile 140 closure means.

FIG. 460 is a medial side 35 view of an upper 23 of an article of footwear 22 including a strap 118.3 that is held in position by a retainer 123 on the superior side 37 which is generally similar to that shown in FIG. 458, but further including an integral strap portion that also encompasses the posterior side 34 of the upper 23.

FIG. 461 is a lateral side 36 view of the upper 23 of an article of footwear 22 shown in FIG. 460. Again, the portion of strap 118.3 which passes from the medial side 35 through the retainer 123 on the superior side 37 can be attached to a D-ring 150, and the portion of the strap 118.3 that extends upwards on the lateral side 36 can include male and female VELCRO® hook and pile 140 closure means. As shown, the strap 118.3 further includes an integral strap portion that also encompasses the posterior side 34 of the upper 23.

FIG. 462 is a lateral side 36 view of the upper 23 of an article of footwear 22 including a strap 118.3 made from a resilient and elastic material. For example, the strap 118.3 can be made of a thermoplastic material or thermoset material which is resilient and elastomeric, thus capable of substantial elongation and recovery. The strap 118.3 includes an opening 72 on the inferior side 38 for the passage of a fastener 29 therethrough, and can be selectively removed and replaced, as desired. A multiplicity of different designs and styles of a resilient and elastomeric strap 118.3 are possible.

FIG. 463 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 that includes two bladders 101.1 and 101.2, and a selectively removable and replaceable spring element 51. As shown, the wall 132 of bladder 101.1 overlaps the superior side of the superior spring element 47, and also the inferior side of the inferior spring element 50. The posterior outsole element 46 can be affixed directly to the wall 132 of the bladder 101.1. The article of footwear 22 can include an external heel counter 24, or an internal heel counter 24, as shown. With the use of a fastener 29 the upper 23 including the heel counter 24 can be mechanically affixed to the superior spring element 47, inferior spring element 50, and portions of the wall 132 of bladder 101.1. The bladder 101.1 can include an opening 72 near the anterior side, and/or a portion of the superior side for facilitating the insertion of portions of the superior spring element 47 and inferior spring element 50. As shown, the wall 132 of bladder 101.2 overlaps the superior side of the

anterior spring element 48.1, and also the inferior side of the anterior spring element 48.2. The anterior outsole element 44 can be affixed directly to the wall 132 of the bladder 101.2. With the use of at least one fastener 29, the upper 23 can be mechanically affixed to the anterior spring element 48.1, anterior spring element 48.2, anterior spacer 55.2, and portions of the wall 132 of bladder 101.2. The bladder 101.2 can include an opening 72 near the posterior side, and/or a portion of the superior side for facilitating the insertion of portions of the anterior spring element 48.1 and anterior spring element 48.2. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

15 FIG. 464 is a longitudinal cross-sectional lateral side 36 view of an article of footwear 22 that includes two bladders 101.1 and 101.2 generally similar to that shown in FIG. 463, but not including a plurality of fasteners 29, rather the various components are affixed by other conventional means such as the use of adhesives. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

20 FIG. 465 is a lateral side view of an article of footwear 22 generally similar to that shown in FIGS. 306–307, including an upper 23 and strap 118.3, and also including selectively removable and replaceable components. As shown, the superior spring element 47 includes a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

25 FIG. 466 is a longitudinal cross-sectional side view of the article of footwear 22 shown in FIG. 465. As shown, substantially all of the various major components of the article of footwear 22 can be selectively removed and replaced with the use of a single fastener 29.

FIG. 467 is an exploded longitudinal cross-sectional side view of the article of footwear 22 shown in FIGS. 465–466.

FIG. 468 is a lateral side view of an article of footwear 22 including an upper 23 and strap 118.3 generally similar to that shown in FIGS. 458–459, and also including selectively removable and replaceable components. However, the upper 23 has been so configured as to accommodate the further inclusion of a midsole 26 in the forefoot area 58 within the upper 23.

30 FIG. 469 is a longitudinal cross-sectional side view of the article of footwear 22 shown in FIG. 468. As shown, the midsole 26 is located between the insole 31 and the anterior spring element 48, and can include at least one male mating structure 128 and/or female mating structure 129 for affixing the midsole 26 in functional relation to the insole 31 and/or anterior spring element 48. Again, the midsole 26 can be made of a cushioning medium or cushioning means such as a foam material, a fluid-filled bladder, and the like. The further introduction of a midsole 26 can serve to increase the amount of possible deflection and in some applications provide enhanced cushioning effects.

35 FIG. 470 is an exploded longitudinal cross-sectional side view of the article of footwear 22 shown in FIGS. 468–469.

40 FIG. 471 is a lateral side view of an article of footwear 22 including an upper 23 and strap 118.3 generally similar to that shown in FIGS. 458–459, and also including selectively removable and replaceable components. However, the upper 23 has been so configured as to accommodate the further inclusion of a midsole 26 in the forefoot area 58 within the upper 23.

FIG. 472 is a longitudinal cross-sectional side view of the article of footwear shown in FIG. 471. As shown, the midsole 26 is located between the anterior spring element 48 and the web or backing 30 portion of the anterior outsole element 44, and can include at least one male mating structure 128 and/or female mating structure 129 for affixing the midsole 26 in functional relation to the anterior spring element 48 and/or the backing 30 portion of the anterior outsole element 44. Again, the midsole 26 can be made of a cushioning medium or cushioning means such as a foam material, a fluid-filled bladder, and the like. The further introduction of a midsole 26. The further introduction of a midsole 26 can serve to increase the amount of possible deflection and in some applications provide enhanced cushioning effects.

FIG. 473 is an exploded longitudinal cross-sectional side view of portions of the article of footwear 22 shown in FIGS. 471-472.

FIG. 474 is a side view of an article of footwear 22 including a spring element 51 including a superior spring element 47 and an inferior spring element 50, and having a flexural axis 59 located in the forefoot area 58. The flexural axis 59 can be orientated generally consistent with the transverse axis 91, that is, approximately perpendicular to the longitudinal axis 69, or be orientated approximately in the range between 10-50 degrees. As shown, the inferior spring element 50 can be generally planar, or only slightly curved. Alternately, the inferior spring element 50 can be more substantially curved than shown in FIG. 474. As shown, the spring element 51 can be configured and engineered to provide a substantial amount of deflection approximately in the range between 10-50 mm, and can therefore store a substantial amount of energy for later use during the walking, jumping, or running cycle.

FIG. 475 is a longitudinal cross-sectional side view of the article of footwear 22 shown in FIG. 474. As shown, the spring element 51 can include a superior spring element 47 and an inferior spring element 50. The superior spring element 47 can be generally planar, thus substantially the entire length of the superior spring element 47 can bend and flex when loaded. Alternately, the superior spring element can further include an anterior spring element 48 and a posterior spring element 49. Closure means such as strap 118.3 can be affixed in functional relation to the upper 23 by mechanical engagement means such as a fastener 29. The superior spring element 47 can be selectively affixed in functional relation to the inferior spring element 50 by mechanical engagement means such as at least one fastener 29. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation. The sole 32 can include a backing 30 and outsole 43 which can also be selectively removed and replaced, as desired. Alternately, the superior spring element 47 can be affixed in functional relation to the exterior of the upper 23.

FIG. 476 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 475, but the superior spring element 47 further includes an integral heel counter 24 in the rearfoot area 68. Accordingly, the superior spring element 47 would be relatively resistant to bending and flexing in the rearfoot area 68, and greater relative bending and flexing would take place in the midfoot area 67 and forefoot area 58. As shown, the insole 31 can be configured so as to extend beyond the superior edges of the superior spring element 47 in order to protect a wearer from direct contact therewith. Again, a superior spring element 47

can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

FIG. 477 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 475, but the superior spring element 47 further includes an integral heel counter 24 and extended side stabilizer in the rearfoot area 68, midfoot area 67, and also a portion of the forefoot area 58, that is, a position posterior of the approximate position of a wearer's metatarsal-phalangeal joints. Accordingly, the superior spring element 47 would be relatively resistant to bending and flexing in the rearfoot area 68, midfoot area 67, and also a portion of the forefoot area 58, and greater relative bending and flexing would take place in the forefoot area 58 near, at, and anterior of a position associated with the approximate position of a wearer's metatarsal-phalangeal joints. As shown, the insole 31 can be configured so as to extend beyond the superior edges of the superior spring element 47 in order to protect a wearer from direct contact therewith. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

FIG. 478 is a side view of an article of footwear 22 generally similar to that shown in FIG. 474, but including an inferior spring element 50 having concave or downward curvature posterior of the flexural axis 59 and convex or upwards curvature near the posterior end of the inferior spring element 50. This configuration can enhance the overall performance of the spring element 51 in certain applications and athletic activities. As shown, the spring element 51 can be configured and engineered to provide a substantial amount of deflection approximately in the range between 10-50 mm, and can therefore store a substantial amount of energy for later use during the walking, jumping, or running cycle.

FIG. 479 is a side view of an article of footwear 22 generally similar to that shown in FIG. 478, but having a superior spring element 47 that is instead affixed in functional relation to the exterior of the upper 23. The superior spring element 47 can be affixed to the upper 23 with the use of conventional means such as adhesive, and the like. As shown, the superior spring element 47 can include an integral heel counter 24. The inferior spring element 50 can be selectively and removably affixed by mechanical means to a sole 32 including a web or backing 30 portion and an outsole 43, and also to an upper 23 including a superior spring element 47. Alternately, the superior spring element 47 can be affixed to the upper 23 with the use of removable mechanical engagement means, thus be selectively removable and replaceable, as shown in FIG. 480.

FIG. 480 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 479, but the superior spring element 47 is not affixed to the upper 23 by adhesive means. The article of footwear 22 further includes an internal stability element 136 that can at least partially define the configuration or shape of portions of the upper 23, and also an anterior spacer 55 for use between the superior spring element 47 and the inferior spring element 50. When the components of the article of footwear 22 are assembled with the use of at least one fastener 29, a portion of the upper 23 can thereby be secured between the stability element 136 and the superior spring element 47. Accordingly, similar to the embodiment shown in FIG. 476, substantially all of the components of the article of footwear 22 shown in FIG. 480 are selectively removable and replaceable. As shown, a fastener 29 can be recessed and

thereby not protrude from the surface of a component into which it is inserted. Again, a superior spring element 47 can alternately consist of a posterior spring element 49 and an anterior spring element 48 which are formed as individual parts and affixed together in functional relation.

FIG. 481 is a longitudinal cross-sectional side view of an article of footwear 22 generally similar to that shown in FIG. 480, but the superior spring element 47 instead includes an integral heel counter 24 that is located only in the rearfoot area 68, and the anterior spacer 55 for use between the superior spring element 47 and the inferior spring element 50 is gently rounded near its posterior side. The gently rounded shape of the posterior side of the anterior spacer 55 can help to prevent high local point loads from being placed on the superior spring element 47 and inferior spring element 50, that is, as compared with an anterior spacer 55 having a triangular shape near its posterior side. Further, the use of an anterior spacer 55 which is resilient and elastomeric, such as one made of rubber, polyurethane, or a thermoplastic elastomer, can also serve to avoid the introduction of high local point loads. Similar to the embodiment shown in FIG. 480, when the components of the article of footwear 22 are assembled with the use of at least one fastener 29, a portion of the upper 23 can thereby be secured between the portion of element 136 and the superior spring element 47. Accordingly, similar to the embodiment shown in FIG. 480, substantially all of the components of the article of footwear 22 are selectively removable and replaceable.

FIG. 482 is a longitudinal cross-sectional side view of an article of footwear 22 including two fluid-filled bladders 101.1 and 101.2, and an outsole 43 that extends substantially full length between the posterior side 34 and the anterior side 33 of the article of footwear 22. As shown, the various components of the article of footwear 22 can be selectively removed and replaced with the use of at least one fastener 29. Alternately, the components of the article of footwear 22 could be affixed in functional relation by conventional means such as the use of adhesives.

FIG. 483 is a longitudinal side cross-sectional view of an article of footwear 22 including a plurality of foam cushioning elements 135, and an outsole 43 that extends substantially full length between the posterior side 34 and the anterior side 33 of the article of footwear 22. As shown, the various components of the article of footwear 22 can be selectively removed and replaced with the use of at least one fastener 29. Alternately, the components of the article of footwear 22 could be affixed in functional relation by conventional means such as the use of adhesives.

FIG. 484 is a longitudinal cross-sectional side view of an article of footwear 22 including a midsole 26 between the upper 23 and superior side of the spring element 51 in the rearfoot area 68, and also between the inferior side of the spring element 51 and the outsole 43 in the forefoot area 58. As shown, the components of the article of footwear 22 can be affixed in functional relation by conventional means with the use of adhesives.

FIG. 485 is a longitudinal cross-sectional side view of an article of footwear 22 including a midsole 26 between the upper 23 and superior side of the spring element 51 in the rearfoot area 68, midfoot area 67, and forefoot area 58, and also between the inferior side of the spring element 51 and the outsole 43 in the forefoot area 58. As shown, the components of the article of footwear 22 can be affixed in functional relation by conventional means with the use of adhesives.

FIG. 486 is a longitudinal cross-sectional side view of an article of footwear 22 including a midsole 26 between the

upper 23 and superior side of the spring element 51 in the rearfoot area 68, midfoot area 67, and forefoot area 58. As shown, the components of the article of footwear 22 can be affixed in functional relation by conventional means with the use of adhesives.

FIG. 487 is a longitudinal cross-sectional side view of an article of footwear 22 including a midsole 26 in the forefoot area 58 between the inferior side of the spring element 51 and the outsole 43. As shown, the components of the article of footwear 22 can be affixed in functional relation by conventional means with the use of adhesives.

FIG. 488 is a longitudinal cross-sectional side view of a boot 22 including a spring element 51 with parts broken away. Shown is an embodiment of a boot that is particularly suitable for use by the armed forces. The spring element 51 can be made of carbon fiber composite material, a spring grade titanium such as "15-3" made by TIMET<sup>®</sup>, Titanium Metals Corporation of 403 Ryder Avenue, Vallejo, Calif. 94590, or a combination of both materials. When maximum weight reduction is desired, the spring element 51 can be made of carbon fiber composite material. However, when maximum protection against explosive devices such as land mines or enemy fire is desired, the spring element 51 can be made at least in part of spring grade titanium material.

For example, given a man of average body weight, the anterior spring element 48 can be made of "15-3" spring grade titanium having a thickness of approximately 1.6 mm, the posterior spring element 49 can be made of a carbon fiber composite material formed in an anatomical three dimension shape including an integral heel counter 24, and the inferior spring element 50 can be made of "15-3" spring grade titanium having a thickness approximately in the range between 3.5-4.5 mm. Accordingly, substantially the entire plantar side of a wearer's foot can thereby be shielded by a layer of spring grade titanium. The insole 31 can extend upwards in the area corresponding to a wearer's arches and encompass the rearfoot area 68 in order to shield a wearer's foot from direct contact with the heel counter 24 and enhance fit. As shown, the posterior spring element 49 can overlap a portion of the anterior spring element 48 that in turn can overlap a substantial portion of the backing 30 portion of the anterior outsole element 44. The generally planar web portion 114 of the sole 32 can be direct injection molded to the inferior side 38 of the upper 23. However, the web portion 114 can include a plurality of openings 72 for permitting the traction members 115 associated with the anterior outsole element 44 to pass therethrough. Alternately, the traction members 115 and sole 32 in forefoot area 58 can be formed as an integral unit by direct injection molding, that is, in a conventional manner. When the generally planar web portion 114 of the sole 32 is made of a resilient and elastomeric material such as a thermoplastic or thermoset natural or synthetic rubber, and the web portion 114 also has a substantial thickness that perhaps approximates one quarter inch, then it can be advantageous for overall performance to at least partially encapsulate a metal insert 95 including an opening 72 for accommodating a fastener 29 in the sole 32 during the direction injection molding process. A full-hex blind threaded insert made by Alstec Engineering, Inc. similar to that shown in FIG. 489 can be used as the female part 86 of the fastener 29, and the male part 85 of the fastener 29 can consist of a bolt having a flat head including an Allen or star drive such as those made by Stayfast Products, Inc., and having its threads coated with nylon to serve as a self-locking mechanism.

The thickness and stiffness of the anterior spring element 48, posterior spring element 49, and inferior spring element

48, posterior spring element 49, and inferior spring element

50 can be selected from a variety and range of options in order to provide optimal performance depending upon whether an individual is walking, running, or possibly carrying a heavy pack. Further, the ground engaging portion 53 of the anterior outsole element 44 and also the posterior outsole element 46 can be selected from a variety and range of options with respect to their specific physical and mechanical properties and material composition. For example, a relatively soft material providing superior cushioning characteristic could be selected for use when drilling or running on asphalt, whereas a material having a wettability index of equal to or greater than 90 degrees, that is, hydrophobic properties could be selected for use in muddy conditions. Further, a material that is hydrophilic and porous could be suitable for use in snow or slippery conditions. In brief, the configuration of the traction elements 115 and their material composition can be selected for the specific anticipated or required task, terrain, and weather conditions. In less than one minute, the article of footwear 22 can be completely disassembled and re-assembled and any selected components then be replaced. Accordingly, the present invention can provide versatility and superior performance to members of the armed forces.

FIG. 489 is a longitudinal cross-sectional side view of an article of footwear 22 including an anterior outsole element 44 and also a posterior outsole element 46 including a web portion 114. In this embodiment of an article of footwear 22, the anterior outsole element 44 and the posterior outsole element 46 do not include a separate backing 30, rather, an integral web portion 114 made of the same material which is used to make the outsole 43 and traction members 115.

FIG. 490 is an exploded longitudinal cross-sectional side view of the article of footwear 22 shown in FIG. 489.

FIG. 491 is a longitudinal cross-sectional side view of an article of footwear 22 including an anterior outsole element 44 having traction members 115 including an undercurl 154 portion. The individual traction members 115 can include an undercurl 154 portion about their perimeter that matches the size of the corresponding registered openings 72 which are present in the upper 23. Accordingly, the traction members 115 can overlap and effectively seal the openings 72, and the anterior outsole element 44 can be snap-fitted and mechanically locked in place when the traction members 115 of the anterior outsole element 44 are properly inserted through the upper 23.

FIG. 492 is an exploded longitudinal cross-sectional side view of the article of footwear 22 shown in FIG. 491.

FIG. 493 is a longitudinal cross-sectional side view of an article of footwear 22 including an anterior outsole element 44 including a web 114 portion that is affixed to the exterior of the upper 23. In this embodiment, the anterior outsole element 44 including a web 114 portion can possibly be affixed to the exterior of the upper 23 with the use of adhesives, and in particular, the use of a protective peel-ply layer 149 which can be removed to expose a self-adhesive surface 100, or alternately, with the use of VELCRO® hook and pile 140, bonding, welding, or other conventional means.

FIG. 494 is a longitudinal cross-sectional side view of an article of footwear 22 including an anterior outsole element 44 including a backing 30 that is affixed to the exterior of the upper 23. In this embodiment, the anterior outsole element 44 including a backing 30 can possibly be affixed to the exterior of the upper 23 with the use of adhesives, and in particular, the use of a protective peel-ply layer 149 which can be removed to expose a self-adhesive surface 100, or

alternately, with the use of VELCRO® hook and pile 140, bonding, welding, or other conventional means.

FIG. 495 shows multiple views of a prior art snap rivet 151 made by Richco, Inc. of Chicago, Ill. The snap rivet 151 can be installed by inserting the inferior portion into an opening and applying direct pressure to the superior portion. A snap rivet 151 can possibly be used as a fastener 29 when it is desired to adjust the width and girth of an article of footwear 22.

10 FIG. 496 shows multiple views of a prior art push rivet 152 made by Richco, Inc. of Chicago, Ill. The push rivet 152 can be installed by inserting the inferior portion into an opening, and applying direct pressure to the superior pin portion. A push rivet 152 can possibly be used as a fastener 29 when it is desired to adjust the width and girth of an article of footwear 22.

15 FIG. 497 shows a perspective view of a prior art full-hex blind threaded insert. FIG. 498 shows a side view of the prior art full-hex blind threaded insert shown in FIG. 497. FIG. 499 shows a top view of the prior art full-hex blind threaded insert shown in FIG. 497. FIGS. 497-499 show multiple views of a prior art full-hex blind threaded insert made by Atlas Engineering, Inc. of Kent, Ohio which can be used as a female part 86 of a fastener 29. When a single female part 86 of a metal fastener 29 generally similar to that shown in FIGS. 497-499 is being used to affix the components of an article of footwear 22 together, the approximate A dimension as indicated in FIG. 498 will vary in accordance with the width of the superior spring element, upper, and inferior spring element, but will generally be in the range between 5-20 mm, and in particular, commonly in the range between 5-12 mm. Further, the approximate B dimension as indicated in FIG. 498 will generally be in the range between 1.0-2.0 mm. In addition, the approximate C dimension as indicated in FIG. 498 will generally be in the range between 8-25 mm, and in particular, commonly in the range between 10-20 mm. Moreover, the approximate D dimension as indicated in FIG. 499 will generally be in the range of 5-15 mm, and in particular, commonly in the range between 8-12 mm. The required size of the threaded opening is normally in the range between  $\frac{1}{4}$ th and  $\frac{1}{2}$  inch, thus  $\frac{1}{16}$ ths of an inch can generally be used.

20 FIG. 500 is a perspective view of a bolt or male part 85 of a fastener 29 for possible use with the female part 86 of a fastener 29 that is shown in FIGS. 497-499. As shown, the male part 85 can include an Allen head, or other mechanical engagement means, whereby the male part 85 and female part 86 of the fastener 29 can be secured together to a desired torque value. The required size of the threaded portion of the male part 85 is generally in the range between  $\frac{1}{4}$ th and  $\frac{1}{2}$  inch, thus  $\frac{1}{16}$ ths of an inch can generally be used. The bolt or male part 85 can include a thin plastic coating 138 for preventing it from becoming accidentally loosened.

25 FIG. 501 is a medial side view of an article of footwear 22 including a three quarter length superior spring element 47 and external heel counter 24. The heel counter 24 can be made of a glass or carbon fiber composite material, or alternately, a thermoplastic material reinforced with short or long fibers which is substantially rigid. For example, Dow Chemical Company of Midland, Mich. makes SPEC-TRUM® reaction moldable polymer which has been used to make automobile body parts, and LNP Engineering Plastics of Exton, Pa. makes THERMOCOMP® and VERTON® thermoplastic materials which can include long carbon fibers. The inferior spring element 50 is symmetrical in curvature on both the medial side 35 and lateral side 36. However, it can be advantageous for providing rearfoot

stability during running for the flexural axis 59 to be deviated from the transverse axis 91 in the range between 10–50 degrees, and in particular, 20–30 degrees. Given the configuration shown in FIG. 501, the overall length of the inferior spring element 50 for a men's size 9 article of footwear can be approximately in the range between 120–130 mm, and the approximate width can be in the range between 70–80 mm at the widest portion. In this embodiment, the approximate required thickness of the inferior spring element 50 for a man's size 9 is generally in the range between 4–8 mm, and the inferior spring element 50 is configured to provide deflection approximately in the range between 10–15 mm.

FIG. 502 is a medial side view of an article of footwear 22 including a full length superior spring element 47 and external heel counter 24. As shown, the heel counter 24 can include a recess on the inferior side 38 for accommodating the anterior portion of the inferior spring element 50. Also shown in dashed lines is a fastener 29 for affixing the posterior portion of the superior spring element 47 in functional relation to the external heel counter 24.

FIG. 503 is a medial side view of an article of footwear 22 including a full length superior spring element 47. The superior spring element 47 can further include an anterior spring element 48, and also a posterior spring element having an anatomical three dimensional cupped shape. The configuration of the superior spring element 47 or posterior spring element 49 in the rearfoot area can mate with that of the external heel counter 24. For example, mechanical engagement means such as mating male and female element can be included in the configuration of the superior spring element 47 and external heel counter 24.

FIG. 504 is a top plan view of a superior spring element 47 similar to that shown with dashed lines in FIG. 502 for use in an article of footwear 22. Shown are the longitudinal axis 69, transverse axis 91, flexural axis 59, a line 104 indicating the approximate relative position of the metatarsal-phalangeal joints of a hypothetical wearer, openings 72 for accommodating at least one fastener 29, and a plurality of flex notches 71.

FIG. 505 is a top plan view of the inferior spring element 50 shown in FIGS. 501–503 for possible use with a superior spring element 47 generally similar to that shown in FIG. 504. Shown are the longitudinal axis 69, transverse axis 91, flexural axis 59, and openings 72 for accommodating at least one fastener 29. Given the configuration shown in FIG. 505, the overall length of the inferior spring element 50 for a men's size 9 article of footwear can be approximately in the range between 120–130 mm, and the approximate width can be in the range between 70–80 mm at the widest portion. In this embodiment, the approximate required thickness of the inferior spring element 50 for a man's size 9 is generally in the range between 4–8 mm, and the inferior spring element 50 is configured to provide deflection approximately in the range between 10–15 mm.

FIG. 506 is a medial side view of an article of footwear 22 including a three quarter length superior spring element 47, and an inferior spring element 50 that extends rearward substantially beyond the posterior side 34 of the upper 23. Alternately, the inferior spring element 50 could possibly not extend so substantially beyond the posterior side 34 of the upper 23 in the embodiments shown in FIGS. 506–510, and 519, rather, the posterior side of the inferior spring element 50 could be located approximately adjacent or consistent with the posterior side 34 of the upper 23, that is, along the vertical or z axis. The inferior spring element 50 is symmetrical in curvature on both the medial side 35 and lateral

side 36. However, it can be advantageous for providing rearfoot stability during running for the flexural axis 59 to be deviated from the transverse axis 91 in the range between 10–50 degrees, and in particular, 20–30 degrees. The inferior spring element 50 has greater length than the embodiment previously shown in FIG. 501. Given the configuration shown in FIG. 506, the overall length of the inferior spring element 50 for a men's size 9 article of footwear can be approximately in the range between 150–160 mm, and the approximate width can be in the range between 70–80 mm at the widest portion. In this embodiment, the approximate required thickness of the inferior spring element 50 for a man's size 9 is generally in the range between 5–10 mm, and the inferior spring element 50 is configured to provide more substantial deflection approximately in the range between 20–25 mm. Further, the forefoot area of this embodiment also includes a more substantial midsole 26 including foam material 134.

FIG. 507 is a medial side view of an article of footwear 22 including a full length superior spring element 47, and an inferior spring element 50 that extends rearward substantially beyond the posterior side 34 of the upper 23. This embodiment is generally similar in many respects to that shown in FIG. 506, but the midsole 26 and outsole 43 associated with the forefoot area extends further towards the posterior side 34 to at least partially surround the anterior side of the inferior spring element 50. This can provide more support to the midfoot area, and also facilitate a smoother transition during walking or running activity.

FIG. 508 is a medial side view of an article of footwear 22 including a full length superior spring element 47 including an anatomical three dimensional cupped shape, a fluid-filled bladder 101, and an inferior spring element 50 that extends rearward substantially beyond the posterior side 34 of the upper 23. This embodiment is generally similar in many respects to that shown in FIG. 507, but the midsole 26 and outsole 43 associated with the forefoot area extends even further towards the posterior side 34 and more substantially beneath the inferior spring element 50. This can provide more support to the midfoot area, and also facilitate a smoother transition during walking or running activity. The midsole 26 also includes a fluid-filled bladder 101 including a wall 132 and at least one chamber 133 as taught in the recited patents and patent applications that have been previously incorporated by reference herein. In particular, at least one fluid-filled bladder including valves that can serve as a motion control device can be used, as taught in WO 01/70061 A2 entitled "Article of Footwear With A Motion Control Device," by John F. Swigart and assigned to Nike, Inc. Moreover, at least one fluid-filled bladder that forms part of a larger dynamically-controlled cushioning system can be used, as taught in WO 01/78539 A2 and U.S. Pat. No. 6,430,843 B1 entitled "Dynamically-Controlled Cushioning System For An Article of Footwear," by Daniel R. Potter and Allan M. Schrock, and assigned to Nike, Inc. Such an article of footwear can include at least one fluid-filled bladder including a plurality of chambers, a control system possibly including a CPU, a pressure detector, and a regulator for modulating the level of fluid communication between different fluid-filled bladders or chambers. It can be readily understood and is hereby explicitly stated that the teachings associated with the patents and patent applications relating to fluid-filled bladders that have been recited and previously incorporated by reference herein can be used in synergistic combination with any or all of the embodiments of an article of footwear taught in the present application.

FIG. 509 is a medial side view of an article of footwear 22 including a fluid-filled bladder 101 which extends between the midfoot and forefoot areas, and an inferior spring element 50 that extends rearward substantially beyond the posterior side 34 of the upper 23. This embodiment is generally similar in many respects to that shown in FIG. 508, but the fluid-filled bladder 101 is larger and extends substantially into the forefoot area anterior of the approximate location of the average wearer's first metatarsal-phalangeal joint 88.

FIG. 510 is a medial side view of an article of footwear 22 including a removable and replaceable middle outsole element 45 or stabilizer 63 which is affixed to a fluid-filled bladder 101 that is removable therewith, and an inferior spring element 50 that extends rearward substantially beyond the posterior side 34 of the upper 23. The stiffness in compression and other physical and mechanical properties of the middle outsole element 45 can thereby be selected from a variety of different options provided to a customer, and the performance of the article of footwear can be customized for an individual wearer.

FIG. 511 is a top plan view of a superior spring element for possible use in an article of footwear generally similar to that shown in FIG. 507. Also shown are the longitudinal axis 69, transvers axis 91, flexural axis 59, and at least one opening 72 for accommodating at least one fastener 29. Again, it can be advantageous for providing rearfoot stability during running for the flexural axis 59 to be deviated from the transverse axis 91 in the range between 10–50 degrees, and in particular, 20–30 degrees. As result, and as previously discussed, the length of the effective lever arm on the medial side 35 of the inferior spring element 50 will be shorter than that on the lateral side 36, that is, as measured between the posterior side of the inferior spring element 50 and the location of the flexural axis 59 on each respective side. One way of expressing the length differential of the effective lever arms of the inferior spring element 50 on the medial side 35 versus the lateral side 36 is with a ratio, as taught by Herr et al. in U.S. Pat. No. 6,029,374, this patent having been previously incorporated by reference herein. In this regard, it can be advantageous for effecting rearfoot stability that the ratio of the length of the effective lever arms on the lateral side 36 relative to those on the medial side 35 be in the range between 1/1 to 2/1, and in particular, in the range between 1.25/1 to 2/1, and preferably in the range between 1.25/1 to 1.75/1.

FIG. 512 is a top plan view of a superior spring element 47 including flex notches 71 on the lateral side 36 for possible use in an article of footwear 22 generally similar to that shown in FIG. 507. Given the sometimes dramatic curvature of a superior spring element 47 towards the medial side 35 in an article of footwear 22 having a curved or semi-curve lasted configuration, a superior spring element 47 made of a relatively homogenous carbon fiber composite material will commonly exhibit greater stiffness in bending on the lateral side 36 relative to the medial side 35. All things being equal, the straighter the last and corresponding configuration of the superior spring element 47, the less the stiffness differential, and conversely, the more curved the last and corresponding configuration of the superior spring element 47, the greater the stiffness differential. Accordingly, it can sometimes be advantageous to introduce flex notches 71 that are longer, or more numerous on the lateral side 36 versus the medial side 35 in order to reduce, eliminate, or even reverse the stiffness differential. As previously discussed, it can sometimes be advantageous to create a "forefoot strike zone," that is, an area of relatively

reduced stiffness in compression, torsional stiffness, and stiffness in bending on the lateral side 36 near the position normally associated with the average wearer's fifth metatarsal-phalangeal joint 89.

FIG. 513 is a top plan view of a three quarter length superior spring element 47 including flex notches 71 on the lateral side 36 for possible use in the articles of footwear shown 22 in FIGS. 501 and 506.

FIG. 514 is a top plan view of a superior spring element 47 including flex notches 71 on the lateral side 36 resembling those shown in FIG. 512, but also including two less substantial flex notches 71 on the medial side. The superior spring element 47 also includes an anatomical three dimensional cupped shape for conforming to a wearer's heel in the rearfoot area. This configuration can be used the article of footwear 22 shown in FIG. 508. When the side profile of a three dimensional cupped shape in the rearfoot area is sufficiently elevated, it can form an internal or external heel counter 24.

FIG. 515 is a top plan view of the inferior spring element 50 shown in FIGS. 506–510, and 519. Shown is the longitudinal axis 69, transvers axis 91, flexural axis 59, and at least one opening 72 for accommodating at least one fastener 29. Given the configuration shown in FIG. 515, the overall length of the inferior spring element 50 for a men's size 9 article of footwear can be approximately in the range between 150–160 mm, and the approximate width can be in the range between 70–80 mm at the widest portion. In this embodiment, the approximate required thickness of the inferior spring element 50 for a men's size 9 is generally in the range between 5–10 mm, and the inferior spring element 50 is configured to provide more substantial deflection approximately in the range between 20–25 mm.

FIG. 516 is an enlarged medial side view of the inferior spring element 50 shown in FIG. 515. As shown, the inferior spring element 50 is made of a relatively homogenous construction including carbon fiber composite material.

FIG. 517 is a medial side view of an alternate inferior spring element 50 generally similar to that shown in FIGS. 515–516, but including a laminate structure. In particular, the inferior spring element 50 includes a laminate 155 made of carbon fiber composite material, or the like, on the opposing superior side 37 and inferior side 38, whereas the core can be made of a different material, e.g., foam, rubber, wood, thermoplastic, resin, epoxy, fiberglass, carbon fiber composite, or polyurethane material. In particular, when the thickness of a spring element is greater than approximately 5 mm, a laminate construction can sometimes be used to reduce the weight and cost of an inferior spring element 50, as well as to enhance its performance characteristics.

FIG. 518 is a medial side view of an alternate inferior spring element 50 generally similar to that shown in FIGS. 517, but including a laminate structure and having a gradually tapered configuration near the posterior side. As shown, the laminations 155 on the superior side 37 and inferior side 38 converge and directly overlap one another near the posterior side 34. The introduction of a tapered configuration can effectively reduce the exhibited stiffness of the inferior spring element 50 near the posterior side 34, and thereby serve to decrease the peak vertical force and shock associated with footstrike. A tapered configuration can also possibly serve to more evenly distribute loads throughout the inferior spring element 50.

FIG. 519 is a medial side view of an article of footwear 22 generally similar to that shown in FIG. 510, but also including a fluid-filled bladder 101 between the inferior side of the upper 23 and superior side of the inferior spring

element 50. The fluid-filled bladder 101 portion substantially located on the superior side of the inferior spring element 50, or upper portion, can be in fluid communication with that portion substantially located on the inferior side of the inferior spring element 50, or lower portion. When the inferior spring element 50 is caused to deflect upwards upon footstrike, the resulting increase in fluid pressure in the upper portion of the fluid-filled bladder 101 can be intelligently directed to the lower portion, and in particular, towards the medial side thereof in order to increase the local stiffness in an optimal manner. Again, at least one fluid-filled bladder including valves that can serve as a motion control device can be used, as taught in WO 01/70061 A2 entitled "Article of Footwear With A Motion Control Device," by John F. Swigart and assigned to Nike, Inc. Moreover, at least one fluid-filled bladder that forms part of a larger dynamically-controlled cushioning system can be used, as taught in WO 01/78539 A2 and U.S. Pat. No. 6,430,843 B1 entitled "Dynamically-Controlled Cushioning System For An Article of Footwear," by Daniel R. Potter and Allan M. Schrock, and assigned to Nike, Inc. Such an article of footwear can include at least one fluid-filled bladder including a plurality of chambers, a control system possibly including a CPU, a pressure detector, and a regulator for modulating the level of fluid communication between different fluid-filled bladders or chambers. Again, the patent applications recited in this paragraph have been previously incorporated by reference herein.

FIG. 520 is a side view of an engineering drawing of an inferior spring element 50. Shown are the anterior side 33, posterior side 34, superior side 37, inferior side 38, medial side 35, lateral side 36, an opening 72 for accommodating a fastener 29, the anterior portion 157, middle portion 158, posterior portion 159, anterior tangent point 160, posterior tangent point 161, anterior curve 162, thickness 164, and the symmetrical fitted radius of curvature 163. In this embodiment the dimensions are approximately as follows: the overall length of the inferior spring element is 4.75 inches; the length of the anterior portion 157 is 0.815 inches; the length of the middle portion is 2.435 inches; the length of the posterior portion is 1.5 inches; the thickness is 0.1476 inches; the vertical distance between the inferior side of the anterior portion 157 and inferior side of the posterior portion 159 adjacent the posterior tangent point 161 is 0.1476 inches, and the symmetrical fitted radius of curvature 163 is 2.5107. In this particular embodiment, the posterior portion 159 of the inferior spring element 50 is relatively flat or planar. When given an anterior tangent point 160 and a posterior tangent point 161 separated by a given horizontal or anterior to posterior distance, and also by a given vertical or superior to inferior distance, there can be only one radius of curvature that can be drawn from both tangent points 160 and 161 that will define a smooth curve having perfect symmetry that will intersect both tangent points 160 and 161. This single possible solution having perfect symmetry regarding the radius of curvature is hereby defined herein as the symmetrical fitted radius of curvature 163. It can be advantageous to design and configure an inferior spring element 50 using a symmetrical fitted radius of curvature 163 since this can result in the creation of a component in which the forces and loads placed upon it are most evenly distributed throughout the middle portion 158 including the anterior curve 162. This can contribute to mechanical properties that could possibly be considered advantageous, e.g., the degree to which the stress/strain curve is linear, that is, the degree to which the exhibited stiffness of the inferior spring element 50 is said to be stacked when loaded.

Moreover, it can also possibly contribute to the robustness and service life of the inferior spring element 50.

FIG. 521 is a side view of an engineering drawing of an inferior spring element 50 generally similar to that shown in FIG. 520, but having an upwardly inclined 165 posterior portion 159. As shown, the posterior portion 159 of the inferior spring element 50 is inclined 165 upwards at a 2 degree angle starting at the posterior tangent point 161 and extending to the posterior side 34 thereby creating an inclined posterior portion 159. When the inferior spring element 50 is affixed in functional relation to an article of footwear 22, this inclined 165 configuration can possibly be advantageous for reducing an undesirable leverage effect that can be generated near the lateral posterior corner of the inferior spring element 50 during footstrike and the braking phase of the gait cycle, as previously discussed above in this specification.

FIG. 522 is a side view of an engineering drawing of an inferior spring element 50 generally similar to that shown in FIG. 520, but having a posterior portion 159 including a posterior curve 166. Accordingly, the inferior spring element 50 has an anterior curve 162 formed between the anterior tangent point 160 and the posterior tangent point 161, but also a posterior curve 166 formed between the posterior tangent point 161 and the posterior side 34 of the inferior spring element 50. Depending upon the configuration and overall geometry of the associated article of footwear, the radius of curvature could possibly be the same for both the anterior curve 162 and posterior curve 166. Alternately, the posterior curve 166 could have a greater radius of curvature, but generally the posterior curve 166 will have a lesser radius of curvature than that of the anterior curve 162. However, much depends upon the configuration and overall geometry of the associated article of footwear, and in particular, the design and configuration of the outside in the rearfoot area.

FIG. 523 is a top plan view of an inferior spring element 50 generally similar to that shown in FIGS. 505 and 520, but showing several features of the inferior spring element 50 in greater detail. In particular, shown are the anterior portion 157, middle portion 158, posterior portion 159, anterior tangent point 160, posterior tangent point 161, anterior curve 162, and posterior curve 166.

FIG. 524 is a lateral side view of an article of footwear 22 including an external heel counter 24, and a spring element 51 including a superior spring element 47 shown with phantom dashed lines and an inferior spring element 50 having a tapered configuration. Again, an external heel counter can be made of a thermoset fiber composite material possibly including glass, aramide, carbon, or boron fibers, or alternately be made of a reinforced thermoplastic material including short or long fibers. For example, Dow Chemical Company of Midland, Mich. makes SPECTRUM® reaction moldable polymer which has been used to make automobile body parts, and LNP Engineering Plastics of Exton, Pa. makes THERMOCOMP® and VERTON® thermoplastic materials which can include glass or carbon fibers. When the superior spring element 47 is affixed to the external heel counter 24 and the inferior spring element 50 with the use of a fastener 29, the posterior portion of the upper 23 is tripped between the superior spring element 47 and the external heel counter 24 and thereby affixed and secured in functional relation thereto. In this embodiment, nearly all of the deflection in the rearfoot area 68 will be provided by the inferior spring element 50, that is, the portion of the superior spring element 47 which overlaps the external heel counter 24 will not substantially flex during use.

FIG. 525 is a medial side view of the article of footwear shown in FIG. 524 showing the shorter relative effective length of the lever arm of the inferior spring element 50 on the medial side 35 relative to the lateral side 36, and also the tapered configuration of the inferior spring element 50.

FIG. 526 is a side view engineering drawing showing the dimensions of an inferior spring element 50 for possible use with a men's size 9 article of footwear such as that shown in FIGS. 524 and 525. As shown, the inferior spring element 50 has an overall length of 5.5 inches, and the anterior portion 157 can measure 1.25 inches, the middle portion 158 can measure 2.5 inches, and the posterior portion 159 can measure 1.75 inches. Alternately, the overall length can be reduced by 0.25 inch by subtracting 0.125 inches from both the anterior portion 157 and the posterior portion 159. As shown, the fitted symmetrical radius of curvature 163 of the anterior curve 162 has a radius of 2.845 inches, whereas the radius of curvature of the superior side 37 of the posterior curve 166 is 9.0 inches, and the radius of curvature corresponding to the tapering of the inferior side 38 of the posterior portion 159 is 5.138 inches. As shown, the vertical distance between the highest and lowest elevation is 0.7085 inches or 18 mm, and the thickness of the particular inferior spring element 50 shown is 0.1970 inches or 5 mm at the anterior side 33 and tapering to only 0.108 inches or 2.75 mm at the posterior side 34. The thickness and tapered configuration of the inferior spring element can be varied for use by individuals having different body weight, running technique, or characteristic running speeds, and also for use in many different activities. If and when desired, the vertical elevation can be changed in the range between 10–18 mm, something that would also cause the fitted symmetrical radius of curvature 163 associated with the anterior curve 162 to also change, but otherwise merely changing the vertical elevation need not substantially change the other dimensions and configuration. Generally, regarding a men's size 9 article of footwear, an advantageous overall length of an inferior spring element for running is in the range between 4.75 and 5.5 inches, the width in the range between 75–85 mm, the vertical distance between the highest and lowest elevation is in the range between 10–18 mm, and the thickness is in the range between 4–5.5 mm at the anterior side 33 and in the range between approximately 2–3 mm at the posterior side 34. Generally, an advantageous fitted symmetrical radius of curvature 163 for use in a men's size 9 running shoe with respect to the anterior curve 162 is in the range between 2.25 and 3.25 inches, an advantageous radius of curvature 181 with respect to the superior side 37 of the posterior curve 166 is in the range between 7 and 11 inches, and an advantageous radius of curvature 182 regarding the inferior side 38 of the posterior portion 159 is in the range between 4–6 inches.

FIG. 527 is a bottom plan view of the inferior spring element 50 shown in FIGS. 524 and 525, also showing an opening 72 and the bottom side of a wear prevention insert 130 inserted therein.

FIG. 528 is a rear view of an article of footwear 22 generally similar to that shown in FIGS. 524 and 525, showing the posterior side 34 of the inferior spring element 50 and its tapered configuration, but also a posterior outside element 46 including a transparent backing 30.

FIG. 529 is a front view of the inferior spring element 50 shown in FIG. 527.

FIG. 530 is a top plan view of the inferior spring element 50 shown in FIG. 527. As shown, the flexural axis 59 is deviated from the transverse axis 91 of the inferior spring element 50 by approximately 20 degrees. When no other

means are being used to create differential stiffness between the medial and lateral sides of an article of footwear which is intended for use in running, given an inferior spring element having the configuration shown, it is generally advantageous for the flexural axis 59 to be deviated from the transverse axis 91 in the range between 20–30 degrees. Further, in a running shoe application it is also generally advantageous to introduce a tapered configuration at least within the posterior portion 159 of the inferior spring element 50. Also shown is the top side of a wear prevention insert 130 further including spines 167 for mating with complimentary spines on another wear prevention insert which can be inserted into the bottom side of an external heel counter. Accordingly, the inferior spring element 50 can be secured to an external heel counter in various positions by merely rotating it by a desired angular increment, thereby adjusting the overall configuration and both the cushioning and stability characteristics of an article of footwear.

FIG. 531 is a bottom plan view of the external heel counter 24 shown in FIGS. 524, 525 and 528, and also showing a wear prevention insert 130 including spines 167 for mating with the complementary wear prevention insert 130 shown in FIG. 530. Further, the longitudinal axis 69 is shown, as well as lines associated with angular deviations of 5 and 10 degrees towards the medial side 35 and also towards the lateral side 36. When an inferior spring element 50 is secured to the external heel counter 24 and/or superior spring element 47 the amount of angular deviation, if any, can be selected as desired. Generally, the maximum amount of angular deviation that is required in order to accommodate wearer's having varying anatomy and biomechanics is less than or equal to 20 degrees, that is, the sum of 10 degrees deviation to the medial side 35 and also to the lateral side 36. More commonly, less than or equal to a total of 15 degrees of angular deviation, or even less than or equal to a total of 10 degrees of angular deviation, that is, the sum of 5 degrees of deviation to the medial side 35 and also to the lateral side 36 can suffice to well serve the stability needs or requirements of wearer's who may have a tendency to over-pronate or over-supinate. Moreover, angular rotation of the inferior spring element 50 can change the length of the effective lever arm and thereby change the effective stiffness and cushioning characteristics provided thereby. Accordingly, both the cushioning and stability characteristics of an inferior spring element 50 can possibly be optimized by an individual wearer selecting a desired angular orientation relative to the longitudinal axis 69.

FIG. 532 is a top plan view of a superior spring element 47 for possible use with an article of footwear having a longitudinal flex notch 71.1 and two flex notches 71.2 and 71.3 on the lateral side 36, and also a wear prevention insert 130 positioned in an opening 72. As shown, notches 71.3 and 71.6 are aligned to approximately correspond to the position of a wearer's metatarsal-phalangeal joint indicated by line 104, thereby creating a line of flexion 54. The length of all the flex notches 71 can be varied to change the local stiffness characteristics and overall performance of the superior spring element 47.

FIG. 533 is a lateral side view of the superior spring element 47 shown in FIG. 532.

FIG. 534 is a top plan view of a superior spring element 47 for possible use with an article of footwear having a longitudinal flex notch 71.1 and three flex notches 71.2, 71.3, and 71.4 on the lateral side 36 which can serve to create a forefoot strike zone 176, that is, an area of reduced local stiffness for attenuating impact events on the lateral side 36 relative to the medial side 35.

FIG. 535 is a lateral side view of the superior spring element 47 shown in FIG. 534.

FIG. 536 is a top plan view of a superior spring element 47 for possible use with an article of footwear having a longitudinal flex notch 71.1 and two flex notches 71.2 and 71.3 on the lateral side 36 that straddle the approximate position corresponding to the metatarsal-phalangeal joints 104 of a wearer's foot. This configuration can facilitate the positioning of a cushioning medium or cushioning means in continuity under the ball of a wearer's forefoot.

FIG. 537 is a lateral side view of the superior spring element 47 shown in FIG. 536.

FIG. 538 is a top plan view of a superior spring element for possible use with an article of footwear having two flex notches 71.2 and 71.3 on the lateral side 36. The presence of a longitudinal flex notch generally serves to decrease the stiffness of the superior spring element 47 near the anterior side 33, and accordingly, all things being equal, this embodiment would be stiffer relative to that shown in FIG. 532.

FIG. 539 is a lateral side view of the superior spring element 47 shown in FIG. 538.

FIG. 540 is a lateral side view of an article of footwear 22 including a superior spring element 47 shown in phantom dashed lines and an inferior spring element 50. The configuration of this article of footwear 22 is generally similar to that shown in FIG. 524, but for the exclusion of the external heel counter 24. Accordingly, the posterior portion of the superior spring element 50 can also contribute to deflection when loaded, that is, depending upon its thickness and stiffness, as desired.

FIG. 541 is a medial side view of the article of footwear 22 shown in FIG. 540.

FIG. 542 is a lateral side view of an article of footwear 22 including a superior spring element 47 including an integral heel counter 24 shown in phantom dashed lines and an inferior spring element 50. This configuration can slightly decrease the overall heel elevation relative to that shown in FIG. 524. Also shown for illustrative purposes is the possible use of an inferior spring element 50 having uniform thickness, as opposed to a tapered configuration.

FIG. 543 is a medial side view of the article of footwear 22 shown in FIG. 542.

FIG. 544 is a rear view of the article of footwear 22 shown in FIGS. 542 and 543, and showing the posterior side 34 of the inferior spring element 50 having uniform thickness.

FIG. 545 is a top plan view of a superior spring element 47 having an integral heel counter 24 for possible use in an article of footwear 22 generally similar to that shown in FIGS. 542, 543, and 544. Accordingly, the superior spring element 47 is configured so as to be positioned inside of the upper 23. Alternatively, the midfoot area 67 and forefoot area 58 of the superior spring element 47 could include other flex notch patterns such as those shown in FIGS. 532, 534, and 536.

FIG. 546 is a lateral side view of the superior spring element 47 shown in FIG. 545.

FIG. 547 is a lateral side view of an article of footwear 22 including a superior spring element 47 including an integral external heel counter 24 and an inferior spring element 50. In this embodiment, the superior spring element 47 is substantially positioned between the upper 23 and the anterior outsole element 44.

FIG. 548 is a medial side view of the article of footwear 22 shown in FIG. 547.

FIG. 549 is a top plan view of a superior spring element 47 including an integral external heel counter 24 for possible use with an article of footwear 22 generally similar to that

shown in FIGS. 547 and 548. Alternately, the midfoot area 67 and forefoot area 58 of the superior spring element 47 could include flex notch patterns as those shown in FIGS. 532, 534, 536, and 545.

FIG. 550 is a lateral side view of an article of footwear 22 including an inferior spring element 50 having asymmetrical curvature on the medial side 35 and lateral side 36. For reference purposes, the reader may wish to refer to the terminology used in FIG. 530 in order to better understand the following discussion. In the inferior spring element 47 shown in FIG. 550, the radius of curvature between the anterior tangent point and posterior tangent point associated with the anterior curve is different on the medial side 35 relative to the lateral side 36. As shown in FIG. 550, the radius of curvature with respect to the anterior curve is smaller on the medial side 35 than on the lateral side 36.

FIG. 551 is a medial side view of the article of footwear 22 shown in FIG. 550.

FIG. 552 is a lateral side view of an article of footwear 22 having parts broken away showing the anterior outsole element 44 affixed directly to the upper 23. In this regard, the anterior outsole element 44 can be affixed by conventional adhesives or with the use of a self-adhesive surface. Alternately, the anterior outsole element 44 can be direct injection molded to the upper 23. In some footwear applications, the anterior outsole element 44 can be made of a recyclable and/or biodegradable plastics material.

FIG. 553 is a lateral side view of an article of footwear 22 having parts broken away showing portions of an anterior outsole element 44 passing through openings 72 in the inferior side 38 of the upper 23. The traction members 115 can be injection molded, co-injection molded, or otherwise affixed in functional relation to a relatively thin backing 30 portion that serves to bridge and properly register the traction members 115 relative to the openings 72, and also more generally within the upper 23. Further, the traction members 115 can also include an undercut 154 portion which can enable the traction members 115 to be press fit or snap fit into place in relation to the upper 23. Further, a gasket 142 generally similar to that shown and discussed in association with FIG. 437 can be used between the anterior outsole element 44 and the upper 23 to help seal and affix their mating surfaces. As shown, the inferior side of the bridge 177 portions of the upper 23 can be reinforced and protected by a wear resistant material such as a plastic material 138. As shown, the insole 31 can include a raised profile in the rearfoot area 68 for providing additional padding and protection from the external heel counter 24.

Also shown is the use of two wear prevention inserts 130, one being inserted into the inferior side of the external heel counter 24, and the other into the superior side of the inferior spring element 50. The two wear prevention inserts 130 can include mating portions for preventing rotation when secured by a fastener 29 as shown in FIGS. 530 and 531. If desired, the head of the fastener 29 can be countersunk so as to fit flush with a superior spring element 47 or inferior spring element 50. The posterior outsole element 46 can include a backing 30 and a pocket 131 into which the posterior end of the inferior spring element 50 can be inserted, and the inferior spring element 50 including the posterior outsole element 46 and backing 30 can then be secured with the use of a fastener 29. Accordingly, the upper 23, insole 31, superior spring element 47, wear prevention

inserts 130, superior spring element 47, external heel counter 24, anterior outsole element 44, inferior spring element 50, posterior outsole element 46, and fastener 29 are

all removable, replaceable and customizable, and substantially affixed by mechanical means possibly including the use of a single fastener 29.

FIG. 554 is a bottom plan view of an upper 23 having a plurality of openings 72 for permitting portions of an anterior outsole element 44 to pass therethrough. Also shown are bridge 177 portions of the upper 23, and the use of a plastic material 138 on the inferior side 38 of the upper. The embodiment of an upper 23 shown in FIG. 554 is generally similar to that shown in FIG. 351, but features a more robust construction near the anterior side 33 including a traction member 115 that is affixed directly to the inferior side 38 and also a portion of the anterior side 33 of the upper 23.

FIG. 555 is a lateral side view of an article of footwear 22 generally similar to that shown in FIG. 553, but further including an anterior outsole element 44 having a backing 30 portion including an integral stability element 136. The stability element 136 is positioned inside the upper 23 and can include a plurality of upwardly directed portions such as 136.1, 136.2, and 136.3 for enhancing stability and fit, but also notches therebetween for enhancing its flexibility characteristics. As shown, the insole 31 can include a raised profile substantially about the circumference of a wearer's foot for providing protection and enhancing comfort.

FIG. 556 is a longitudinal cross-sectional side view of an insole 31 including an elevated heel pad 178 for possible use with an article of footwear 22. By changing the thickness of the heel pad 178 or of the insole 31, the effective length size of an article of footwear 22 into which the insole is inserted can be changed, as desired. In this regard, it is possible to change the effective length size of a given upper 23 by at least one full size range, e.g., a given select upper can be made to fit size 9, 9.5, and 10. This feature can be advantageous since wearer's often have one foot that is one half size larger than the other. Further, a given select upper can then be used to span a greater size range, and this makes for greater economy in manufacturing, but also in supply and inventory.

FIG. 557 is a longitudinal cross-sectional side view of an insole 31 including an elevated heel pad 178, an elevated toe pad 179, but also an elevated side pad 180 for encompassing a wearer's foot. By changing the thickness of the heel pad 178 and/or the toe pad 179 of the insole 31, the effective length size of an article of footwear 22 into which the insole 31 is inserted can be changed, as desired. In this regard, it is possible to change the effective length size of a given upper 23 by at least one full size range, e.g., a given select upper can be made to fit size 9, 9.5, and 10. This feature can be advantageous since wearer's often have one foot that is one half size larger than the other. Further, a given select upper can then be used to span a greater size range, and this makes for greater economy in manufacturing, but also in supply and inventory. Moreover, by changing the thickness of the inferior side 38 and/or the elevated side pad 180 portion of the insole, the effective width and girth of the article of footwear 22 into which the insole 31 is inserted can be changed, as desired. Accordingly, it can be possible to change the effective width of an article of footwear 22 in the range between AA--EE.

FIG. 558 is a lateral side view of an article of footwear 22 having parts broken away showing the possible use of an anterior outsole element 44 including a backing 30 further including an external stability element 136. As shown, a plurality of relatively small fasteners 29 including a male mating structure 128 can pass through openings such as flex notches 71 present in the superior spring element 47 and the inferior side of the upper 23, and then be mechanically

engaged and affixed in functional relation by those complimentary female mating structures 129 included in the anterior outsole element 44. Optionally, the superior side of the anterior outsole element can also include a tactified surface or a self-adhesive surface protected by a removable peel-ply layer for further affixing the anterior outsole element to an upper.

FIG. 559 is a lateral side view of an article of footwear 22 having parts broken away showing the possible use of an anterior outsole element 44 including a backing 30 further including an external stability element 136 that includes upwardly extending straps 118 for use with closure means 120 such as laces 121, straps, and the like. The inclusion of upwardly extending straps 118 for use with closure means 120 can serve to further secure the anterior outsole element 44 in functional relation with the upper 23, and in particular, with respect to an article of footwear that is intended for use in activities requiring substantial lateral movement. The backing 30 portion of the anterior outsole element 44 further includes a plurality of male mating structures 128 such as protuberances 99 and/or hooks 27 for mating with complimentary female mating structures 129 which are present in the upper 23 and/or superior spring element 47. Again, the superior side of the anterior outsole element can also include a tactified surface or a self-adhesive surface protected by a removable peel-ply layer for further affixing the anterior outsole element to an upper.

FIG. 560 is a top plan view of a male part 85 of a fastener 29 for possible use with the female part 86 of a fastener 29 shown in FIGS. 562 and 563, whereby the male part 85 and female part 86 of the fastener 29 can be secured together to a desired torque value. As shown in FIG. 560, the male part 85 of a fastener 29 includes both an Allen drive receptacle 168 and flat blade drive receptacle 169. Accordingly an Allen wrench tool, or alternately a screwdriver or other blade like implement can be used to manipulate the male part 85 of the fastener 29. Moreover, a common piece of span change such as a quarter can alternately be used for the same purpose. When a single male part 85 of a metal fastener 29 generally similar to that shown in FIG. 560 is being used to affix the components of an article of footwear together, the approximate B dimension as indicated in FIG. 560 will generally be in the range between 8-25 mm, and in particular, commonly in the range between 10-20 mm.

FIG. 561 shows a side view of the male part 85 of a fastener 29 shown in FIG. 560. When a single male part 85 of a metal fastener 29 generally similar to that shown in FIGS. 560 and 561 is being used to affix the components of an article of footwear together, the approximate C dimension as indicated in FIG. 561 will generally be in the range between 1.0-2.0 mm. The required size of the threaded portion of the male part 85 is generally in the range between  $\frac{1}{4}$ th and  $\frac{1}{2}$  inch, thus  $\frac{1}{16}$ ths of an inch can generally be used. The bolt or male part 85 can include a thin plastic coating 138 for preventing it from becoming accidentally loosened. Further, the inferior side of the head or flange portion of the bolt or male part 85 can include a textured surface such as a plurality of serrations for enhancing its holding power relative to a portion of a spring element 51.

FIG. 562 shows a side view of a female part 86 of a fastener 29 for possible use with the male part 85 of a fastener 29 shown in FIGS. 560 and 561. When a single female part 86 of a metal fastener 29 generally similar to that shown in FIG. 562 is being used to affix the components of an article of footwear together, the approximate A dimension indicated in FIG. 562 will vary in accordance with the width of the superior spring element, upper, and inferior spring

element, but will generally be in the range between 5–20 mm, and in particular, commonly in the range between 8–12 mm. Moreover, the approximate D dimension as indicated in FIG. 562 will generally be in the range of 5–15 mm, and in particular, commonly in the range between 8–12 mm. The required size of the threaded opening is normally in the range between  $\frac{1}{4}$ th and  $\frac{1}{2}$  inch, thus  $\frac{3}{16}$ ths of an inch can generally be used. Further, the superior side of the head or flange portion of the female part 86 can include a textured surface such as a plurality of serrations for enhancing its holding power relative to a portion of a spring element 51.

FIG. 563 is a bottom plan view of the female part 86 of a fastener 29 shown in FIG. 562, further including the symbol of a registered trademark indicia. Accordingly, the bottom side of an exposed fastener 29 on the inferior side 38 of an article of footwear 22 can simply appear to be a trademark indicia.

FIG. 564 is a side view engineering drawing showing the dimensions of an inferior spring element 50 for possible use with a men's size 9 article of footwear. For example, the article of footwear could be generally similar to those shown in FIGS. 524, 525, 568, 569, or 575, or those shown elsewhere within the present application, and the like. As shown, the inferior spring element 50 has an overall length of 5.25 inches, and the anterior portion 157 can measure 1.125 inches, the middle portion 158 can measure 2.5 inches, and the posterior portion 159 can measure 1.625 inches. Alternately, the overall length can be reduced by 0.25 inch by subtracting 0.125 inches from both the anterior portion 157 and the posterior portion 159. As shown, the anterior portion 157 also projects downwards at a three degree angle towards the anterior side 33. This can facilitate attaining an advantageous geometry and fit with respect to a superior spring element and also an external heel counter. Further, the inferior spring element 50 can have a maximum width in the range between 75–80 mm, and the flexural axis can be deviated from the transverse axis in the range between 20–30 degrees. Given the inferior spring element 50 shown in FIG. 564 for a men's size 9 article of footwear, an advantageous maximum width is approximately 77 mm, and the addition of a posterior outsole element 46 including a backing 30 that overlaps the edges of the inferior spring element 50 by 1.5 mm on both the medial side 35 and lateral side 36 can therefore bring the maximum width of the outside net to approximately 80 mm.

As shown in FIG. 564, the fitted symmetrical radius of curvature 163 of the anterior curve 162 has a radius of 2.606 inches, whereas the radius of curvature of the superior side 37 of the posterior curve 166 is 9.0 inches, and the radius of curvature corresponding to the tapering of the inferior side 38 of the posterior portion 159 is 5.138 inches. As shown, the vertical elevation is 0.629 inches or 16 mm, and the thickness of the particular inferior spring element 50 shown is 0.189 inches or 4.8 mm at the anterior side 33 and tapering to only 0.1083 inches or 2.75 mm at the posterior side 34. If and when desired, the vertical elevation can be changed in the range between 10–18 mm, something that would also cause the fitted symmetrical radius of curvature 163 associated with the anterior curve 162 to also change, but otherwise merely changing the vertical elevation need not substantially change the other dimensions and configuration. The thickness and tapered configuration of the inferior spring element can be varied for use by individuals having different body weight, running technique, or characteristic running speeds, and also for use in many different activities. Given an inferior spring element 50 having the dimensions shown in FIG. 564, the following general guidelines regard-

ing the desired thickness for a wearer could apply: a maximum thickness of 4.0 mm for a wearer having a body weight in the range between 100–120 pounds; 4.25 mm for a wearer in the range between 120–140 pounds; 4.5 mm for a wearer in the range between 140–160 pounds; 4.75 mm for a wearer in the range between 160–180 pounds; 5.0 mm for a wearer in the range between 180–200 pounds; and 5.25 mm for a wearer in the range between 200–220 pounds.

Generally, regarding a men's size 9 article of footwear, an advantageous overall length of an inferior spring element for example is in the range between 4.75 and 5.5 inches, the width in the range between 75–85 mm, the vertical elevation is in the range between 10–18 mm, and the thickness is in the range between 4–5.5 mm at the anterior side 33 and in the range between approximately 2–3 mm at the posterior side 34. Generally, an advantageous fitted symmetrical radius of curvature 163 for use in a men's size 9 running shoe with respect to the anterior curve 162 is in the range between 2.25 and 3.25 inches, an advantageous radius of curvature 181 with respect to the superior side 37 of the posterior curve 166 is in the range between 7 and 11 inches, and an advantageous radius of curvature 182 regarding the inferior side 38 of the posterior portion 159 is in the range between 4–6 inches. When no other means are being used to create differential stiffness between the medial and lateral sides of an article of footwear which is intended for use in running, given an inferior spring element having the configuration shown, it is generally advantageous for the flexural axis to be deviated from the transverse axis in the range between 20–30 degrees.

FIG. 565 is a bottom plan view of an article of footwear 22 having a semi-curved lasted configuration including an inferior spring element 50 and a posterior outsole element 46 including a transparent backing 30 portion. As a result, a substantial portion of the inferior spring element 50 can be seen. Further, when a relatively transparent thermoplastic or polyurethane material is used to make the outside 43 portion of the posterior outsole element 46 as well, substantially the entire inferior spring element 50 can be visible. As shown, the outsole 43 covers only about half of the bottom surface area associated with the inferior spring element 50, and this can provide adequate support and stability for some wearers.

FIG. 566 is a bottom plan view of an article of footwear 22 having a semi-curved lasted configuration including a posterior outsole element 46 that substantially covers the bottom side of the inferior spring element 50. This configuration can provide greater support and stability in the rearfoot area 68 and midfoot area 67 for wearers having a tendency to excessively supinate or pronate. Further, this configuration can also be advantageous for use with articles of footwear intended for use in activities requiring substantial lateral movement.

FIG. 567 is a bottom plan view of an article of footwear 22 having a straight lasted configuration relative to those shown in FIGS. 565 and 566, and also a wider inferior spring element 50 and posterior outsole element 46 in the midfoot area 67. This configuration can provide greater support and stability in the rearfoot area 68 and midfoot area 67 for wearers having a tendency to excessively supinate or pronate, and in particular, those individuals having relatively flat arches. Further, this configuration can also be advantageous for use with articles of footwear intended for use in activities requiring substantial lateral movement.

FIG. 568 is a lateral side view of an article of footwear 22 generally similar to that shown in FIG. 524, further including a fluid-filled bladder 101. Again, the fluid-filled bladder 101 can include a gas that is at ambient atmospheric pres-

sure, or alternately the gas can be pressured above atmospheric pressure. Moreover, the fluid-filled bladder 101 can occupy a portion, or alternately can occupy substantially all of the space between the external heel counter 24 and the inferior spring element 50.

FIG. 569 is a medial side view of an article of footwear 22 generally similar to that shown in FIG. 525, but including a posterior outsole element 46 generally similar to that shown in FIGS. S66 and S67. As shown in FIG. 569, the posterior outsole element 46 can include an integral stabilizer 63 for enhancing both cushioning and stability in the midfoot area 67.

FIG. 570 is a lateral side view of an article of footwear 22 including an upper 23 that is substantially made using three dimensional and/or circular knitting methods, or the like. These methods and techniques are commonly used in the making of apparel such as socks. Various socks and methods of making socks and like apparel items are taught in published patents including, but not limited to: U.S. Pat. No. 1,741,340, U.S. Pat. No. 1,889,716, U.S. Pat. No. 2,102,368, U.S. Pat. No. 2,144,563, U.S. Pat. No. 2,333,373, U.S. Pat. No. 2,391,064, U.S. Pat. No. 2,687,528, U.S. Pat. No. 2,771,691, U.S. Pat. No. 2,790,975, U.S. Pat. No. 3,085,410, U.S. Pat. No. 3,102,271, U.S. Pat. No. 3,274,709, U.S. Pat. No. 3,796,067, U.S. Pat. No. 4,253,317, U.S. Pat. No. 4,263,793, U.S. Pat. No. 4,341,096, U.S. Pat. No. 4,520,635, U.S. Pat. No. 4,615,188, U.S. Pat. No. 4,651,354, U.S. Pat. No. 4,732,015, U.S. Pat. No. 4,898,007, U.S. Pat. No. 5,230,333, U.S. Pat. No. 5,771,495, U.S. Pat. No. 5,784,721, U.S. Pat. No. 5,829,057, U.S. Pat. No. 5,946,731, U.S. Pat. No. 6,021,527, U.S. Pat. No. 6,122,937, U.S. Pat. No. 6,154,983, U.S. Pat. No. 6,138,281, U.S. Pat. No. 6,139,929, U.S. Pat. No. 6,230,525, U.S. Pat. No. 6,247,182, U.S. Pat. No. 6,256,824, U.S. Pat. No. 6,286,151, U.S. Pat. No. 6,292,951, U.S. Pat. No. 6,306,483, U.S. Pat. No. 6,314,584, U.S. Pat. No. 6,324,874, U.S. Pat. No. 6,334,222, U.S. Pat. No. 6,336,227, U.S. Pat. No. 6,354,114, U.S. Pat. No. 6,393,620, U.S. Pat. No. 6,446,267, U.S. Pat. No. 6,451,144, U.S. Pat. No. 6,457,332, EP 0 593 394 A1, D401,758, D403,149, D461,045, and also patents granted to James L. Throneberg including U.S. Pat. No. 4,194,249, U.S. Pat. No. 4,255,949, U.S. Pat. No. 4,277,959, U.S. Pat. No. 4,373,361, U.S. Pat. No. 5,307,522, U.S. Pat. No. 5,335,517, U.S. Pat. No. 5,560,226, U.S. Pat. No. 5,595,005, U.S. Pat. No. 5,603,232, U.S. Pat. No. 5,724,753, U.S. Pat. No. 5,791,163, U.S. Pat. No. 5,881,413, U.S. Pat. No. 5,909,719, U.S. Pat. No. 6,308,438, WO 96/21366, and D374,553. Several of the aforementioned patents also relate to making an upper for an article of footwear, and in particular, U.S. Pat. No. 5,595,005, U.S. Pat. No. 5,724,753, U.S. Pat. No. 5,881,413, U.S. Pat. No. 5,909,719, U.S. Pat. No. 6,154,983, U.S. Pat. No. 6,256,824, U.S. Pat. No. 6,308,438, and D374,553. All of the patents and patent applications recited in this paragraph are hereby incorporated by reference herein.

As shown in FIG. 570, various portions of the upper 23 can thereby be made of different textile materials and knits. For example, the vamp 52 can be made of a four way elastic textile material 137.1 and the quarter 119 can be made of a two way elastic textile material 137.2, whereas the tip 25 and other select portions of the upper 23 can be made with a relatively inelastic textile material 137.3. The primary desired direction of stretch of the elastic textile materials 137.1 and 137.2 has been indicated with arrows. As shown, the upper 23 includes conventional lace 121 closure means 120.

FIG. 571 is a medial side view of an article of footwear 22 including an upper 23 that is substantially made using

three dimensional and/or circular knitting methods, or the like, generally similar to that shown in FIG. 570, further including a plastic material 138. The textile material portion of the upper 23 can be placed in functional relation upon a footwear last, or like mold, and the plastic material 138 can then be injection molded, bonded, fused, or applied with heat and pressure to the textile material.

FIG. 572 is a lateral side view of a portion of an upper 23 that is made using three dimensional and/or circular knitting techniques, or the like. The upper 23 can include a plurality of different textile materials and knits having different aesthetic, mechanical and physical properties. For example, a comfortable knit textile material 137.4 having resilient elastic characteristics can be used about the collar 122 in order to help prevent the entry of foreign matter into the upper 23, a three dimensional textile material 137.6 can be used to form a dorsal pad 172 in order to protect the wearer's foot from binding pressure possibly exerted by closure means, a four way stretch elastic textile material 137.1 can be used in the vamp 52 in order to accommodate flexion of a wearer's toes, a two way or four way stretch elastic textile material 137.2 having greater stiffness and resistance to elongation can be used in the quarter 119, and a textile material 137.3 that provides relatively little elongation and has excellent wear properties can be used in the tip 45 and anterior side 33, and also about the lower portion of the medial side 35, lateral side 36, posterior side 34, and inferior side 38 of the upper 23.

FIG. 573 is a lateral side view of a portion of an alternate upper 23 generally similar to the embodiment shown in FIG. 572, but instead showing the use of a two way or four way stretch textile material 137.2 about a portion of the medial side 35, lateral side 36 and inferior side 38 of the upper 23, and also showing parts broken away. The use of a two way or four way stretch textile material 137.2 between the quarters 119 on the medial side 35 and lateral side 36 passing under the inferior side 38 of the upper 23 and a wearer's foot can introduce a functional elongation capability with respect to the length size of the upper 23. For example, an upper 23 having a given length size corresponding to men's size 9 could thereby be functional for use with sizes 8.5, 9, and 9.5, and perhaps even sizes 8, 8.5, 9, 9.5, and 10. This makes for greater economy in manufacture and supply with respect to inventory. Again, the upper 23 can include a plurality of different textile materials and knits having different aesthetic, mechanical and physical properties. For example, a comfortable knit textile material 137.4 having resilient elastic characteristics can be used about the collar 122 in order to help prevent the entry of foreign matter into the upper 23, a three dimensional textile material 137.6 can be used to form a dorsal pad 172 in order to protect the wearer's foot from binding pressure possibly exerted by closure means, a four way stretch elastic textile material 137.1 can be used in the vamp 52 in order to accommodate flexion of a wearer's toes, a two way or four way stretch elastic textile material 137.2 having greater stiffness and resistance to elongation can be used in the quarter 119 and can also extend about the medial side 35, lateral side 36, and inferior side 38, and a textile material 137.3 that provides relatively little elongation and has excellent wear properties can be used in the tip 45 and anterior side 33, and also about a substantial portion of the lower portion of the medial side 36, lateral side 36, posterior side 34, and inferior side 38 of the upper 23.

FIG. 574 is a lateral side view of the portion of an upper 23 shown in FIG. 573, further including several straps 118.1, 118.2, and 118.3, and also an external stability element 136 consisting of an over-molded plastic material 138. A portion

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of strap 118.1 can be affixed or consist of a portion of the backtab 175. Strap 118.3 includes a d-ring 150 and also VELCRO® hook and pile 140 closure means 120.

FIG. 575 is a lateral side view of an article of footwear 22 including the upper 23 shown in FIG. 574, but further including an external heel counter 24, an inferior spring element 50, a superior spring element 47 and an insole 31 positioned inside the upper 23 that are not visible in the side view, a posterior outsole element 46, a fastener 29, and an anterior outsole element 44. Since the upper 23 can be substantially made without the need for substantial hand stitching or other labor intensive techniques, it can be made economically in the United States, or otherwise near the intended market. Again, the capability of the upper 23 to possibly serve a range of length sizes further simplifies manufacturing, supply, and inventory. Further, as previously discussed, if desired, a substantial portion of an article of footwear 22, that is, greater than fifty percent, and preferably greater than seventy-five percent, and most preferably substantially all of the other major components of the article of footwear can be removably assembled and secured in functional relation to the upper 23 to make a custom article of footwear 22 within minutes. Again, the upper 23 can be substantially made of recyclable and/or biodegradable materials, and substantially all the other various footwear components can also be made of materials that are recyclable. Accordingly, the materials, manufacturing methods, structure and way that various footwear components can be simply and rapidly assembled to make a custom article of footwear, and the method of conducting retail and Internet business taught in the present application can be associated with significant value added and economic efficiency, but also a substantially recyclable and environmentally friendly product.

Given the teachings and substantial disclosure of the present invention in this specification and the associated drawing figures, it can be readily understood that at least some of the following article of footwear component selection options can be provided to a wearer or customer, e.g., via an Internet website, a remote manufacturing or distribution site, a medical facility, or a retail establishment. Moreover, many other selection options are possible. Again, the present invention teaches an article of footwear that can be rapidly assembled and customized in response to an individual's selections. The following is one example of a component selection guide for making a customized article of footwear and practicing the method of conducting retail and Internet business recited in the present application.

**Component Selection Guide for Making An Article of Footwear And Method of Conducting Retail and Internet Business**

**Article of Footwear 22**

**Category/Activity**

Running

Road Running

Trail Running

Road Racing

Track & Field

Basketball

Tennis

Volleyball

Cross-Training

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Walking	
Baseball	
Artificial	
Natural Grass	
Football	
Artificial	
Natural Grass	
Golf	
Sandal	
Soccer	
Indoor	
Outdoor	
Detachable Cleats	
Cycling	
Shimano System	
Speedplay System	

Upper 23	
Size Length	
Size Width	
Style	
Footshape	
Low	
Mid	
High	
Boot	
Other	
Type	
Standard Forefoot Outsole	
3D Wrap Forefoot Outsole	
Laces	
Stretchable Upper	
Straps	
Rearfoot Opening	
Adjustable Width & Girth	

Laces 121	
Size Length	
Short (Low Upper)	
Medium (Mid Upper)	
Long (High Upper)	

Straps 118	
Size Length	
Size Width	
Style	
VELCRO D-Ring	
Laces	
VELCRO D-Ring Plus Heel Strap	
Laces Plus Heel Strap	
Laces Plus Midfoot Stabilizer	
Other	

Insole 31	
Size Length	
Size Width	
Style	
Footshape	
Type	
Standard Forefoot Outsole	
3D Wrap Forefoot Outsole	
Competition	
Training	
Customized Light Cure	

Anterior Spring Element 48	
Size Length	
Size Width	
Style	

Footshape  
Type  
Single Anterior Spring Element  
Curvature (Toe Spring)  
10 mm  
20 mm  
30 mm  
Flex Notch Pattern  
MPJ Flex  
Other  
None (Cycling/Skating)  
Double Anterior Spring Element  
Anterior Spacer  
Neutral  
Pronator  
Supinator  
Flex Notch Pattern  
MPJ Flex  
Other  
None (Cycling/Skating)  
Thickness/Stiffness For Approximate Body Weight  
0.75 mm/80–100 lbs  
1.0 mm/100–120 lbs  
1.25 mm/120–160 lbs  
1.5 mm/160–180 lbs  
1.75 mm/180–200 lbs  
2.0 mm/200–220 lbs

Anterior Outsole Element 44  
Size Length  
Size Width  
Style  
Footshape  
Type  
Single Anterior Spring Element  
Standard Forefoot Outsole  
3D Wrap Forefoot Outsole  
Gasket  
Flex Notch Pattern  
MPJ Flex  
Other  
None (Cycling/Skating)  
Double Anterior Spring Element  
Neutral  
Pronator  
Supinator  
Window for Foam Columns  
Window for Fluid-Filled Bladder  
Flex Notch Pattern  
MPJ Flex  
Other  
None (Cycling/Skating)

Inferior Spring Element 50  
Size Length  
Size Width  
Type  
Pronator  
Neutral  
Supinator  
Total Deflection of Inferior Spring Element  
10 mm  
12 mm  
14 mm  
16 mm  
18 mm  
Other  
Curvature

Symmetrical  
Asymmetrical  
Thickness/Stiffness For Approximate Body Weight  
Note: This can vary greatly depending upon the configuration of an inferior spring element. For example, given an inferior spring element having a length in the range between 75–80 mm, a maximum width in the range between 4.75–5.5 inches, an anterior curve having a fitted symmetrical radius of curvature in the range between approximately 2.25 and 3.0 inches, a tapered posterior portion, and a posterior curve having a radius of curvature of approximately 9 inches, the following general guidelines could apply:  
4.0 mm/100–120 lbs  
4.25 mm/100–140 lbs  
4.5 mm/140–160 lbs  
4.75 mm/160–180 lbs  
5.0 mm/180–200 lbs  
5.25 mm/200–220 lbs  
20 Posterior Outsole Element 46  
Size Length  
Size Width  
Type  
Pronator  
Neutral  
Supinator  
Style  
No Cushioning Element  
Front Cushioning Element  
30 Fluid-Filled Bladder  
Foam Cushioning Element  
Rear Cushioning Element  
Fluid-Filled Bladder  
Foam Cushioning Element  
35 Rear Window for Foam Cushioning Element  
Rear Window for Fluid-Filled Bladder  
Posterior Spring Element 49  
Size Length  
40 Size Width  
Arch Characteristics  
Normal  
High  
Flat  
45 Style  
Flat  
Side Heel Counters  
Full Heel Counter  
Rearfoot Window  
50 Thickness/Stiffness For Approximate Body Weight (Full Heel Counter)  
2.0 mm/100–140 lbs  
2.5 mm/140–180 lbs  
3.0 mm/180–220 lbs  
55 External Heel Counter 24  
Thickness/Stiffness For Approximate Body Weight  
2.0 mm/100–140 lbs  
2.5 mm/140–180 lbs  
60 3.0 mm/180–220 lbs  
Middle Outsole Element 45  
Size Length  
Size Width  
65 Type  
Fluid-Filled Bladder  
Foam Cushioning Element

## Fastener(s) 29

## Primary Fastener Style

- Threaded
- Quick-Release
- Sizes
- 10 mm
- 12 mm
- Other

## Anterior Spring Fastener Style

- Threaded
- Quick-Release
- Sizes
- 6 mm
- 8 mm
- Other

## Adjustable Width &amp; Girth Fastener Style

- Threaded
- Quick Release
- Snap Rivet
- Push Rivet
- Sizes
- 3 mm
- 4 mm
- Other

While the above detailed description of the invention contains many specificities, these should not be construed as limitations on the scope of the invention, but rather as exemplifications of several preferred embodiments thereof. Many other variations are possible. For example, it can be readily understood that the various teachings, alternate embodiments, methods and processes disclosed herein can be used in various combinations and permutations. Accordingly, the scope of the invention should be determined not by the embodiments discussed or illustrated, but by the appended claims and their legal equivalents.

I claim:

1. A method of conducting business including making and selling a custom article of footwear comprising the steps of: collecting data relating to an individual;

creating from said collected data information and intelligence for making said custom article of footwear for said individual;

providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, a plurality of said footwear components including fastening means;

selecting from the plurality of footwear components sufficient footwear components for making said custom article of footwear having an anterior side, a posterior side, a medial side, a lateral side, and comprising at least an upper, a sole, and cushioning means affixable together in functional relation by said fastening means;

providing said information and intelligence and said sufficient footwear components to a physical location at which said custom article of footwear can be made;

securing a plurality of said sufficient footwear components in functional relation with said fastening means and completing the assembly for making said custom article of footwear; and,

causing said custom article of footwear to be delivered to a designated address.

2. The method of conducting business including making and selling a custom article of footwear according to claim 1, said information and intelligence comprising said individual's foot length size and foot width size.

3. The method of conducting business including making and selling a custom article of footwear according to claim 1, said upper comprising at least in part a textile material.

4. The method of conducting business including making and selling a custom article of footwear according to claim 1, said upper substantially comprising a molded upper.

5. The method of conducting business including making and selling a custom article of footwear according to claim 1, said upper substantially comprising a biodegradable material.

6. The method of conducting business including making and selling a custom article of footwear according to claim 1, said fastening means comprising at least one independent fastening component.

15 7. The method of conducting business including making and selling a custom article of footwear according to claim 6, said fastening component comprising a single mechanical fastener including male and female parts.

8. The method of conducting business including making and selling a custom article of footwear according to claim 1, said sufficient footwear components being substantially affixed together in functional relation by mechanical means and being removable and replaceable.

9. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein at least seventy-five percent of said sufficient footwear components are removable and replaceable.

10. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein at least ninety percent of said sufficient footwear components are removable and replaceable.

11. The method of conducting business including making and selling a custom article of footwear according to claim 1, said article of footwear being substantially recyclable.

35 12. The method of conducting business including making and selling a custom article of footwear according to claim 1, said article of footwear further comprising an insole.

13. The method of conducting business including making and selling a custom article of footwear according to claim 12, said insole being removable and replaceable and provided in a plurality of variations including different alternate effective length sizes for possible use within said upper, whereby the effective length size provided by said upper can be selectively varied.

45 14. The method of conducting business including making and selling a custom article of footwear according to claim 12, said insole being removable and replaceable and provided in a plurality of variations including different alternate effective width sizes for possible use within said upper, whereby the effective width size provided by said upper can be selectively varied.

15. The method of conducting business including making and selling a custom article of footwear according to claim 12, said article of footwear further comprising closure means.

55 16. The method of conducting business including making and selling a custom article of footwear according to claim 15, said closure means comprising laces.

17. The method of conducting business including making and selling a custom article of footwear according to claim 1, said article of footwear further comprising a heel counter.

60 18. The method of conducting business including making and selling a custom article of footwear according to claim 17, said heel counter positioned on the exterior of said upper.

19. The method of conducting business including making and selling a custom article of footwear according to claim 1, said cushioning means comprising an elastomeric material.

65 20. The method of conducting business including making and selling a custom article of footwear according to claim 1, said cushioning means comprising an elastomeric material.

20. The method of conducting business including making and selling a custom article of footwear according to claim 19, said elastomeric material comprising a foam material.

21. The method of conducting business including making and selling a custom article of footwear according to claim 1, said cushioning means comprising a fluid-filled bladder.

22. The method of conducting business including making and selling a custom article of footwear according to claim 21, said fluid comprising a gas.

23. The method of conducting business including making and selling a custom article of footwear according to claim 1, said cushioning means comprising a spring.

24. The method of conducting business including making and selling a custom article of footwear according to claim 23, said spring comprising a fiber composite material.

25. The method of conducting business including making and selling a custom article of footwear according to claim 23, said spring comprising a metal material.

26. The method of conducting business including making and selling a custom article of footwear according to claim 23, said spring comprising a spring element.

27. The method of conducting business including making and selling a custom article of footwear according to claim 26, said spring element comprising a superior spring ele-  
ment.

28. The method of conducting business including making and selling a custom article of footwear according to claim 27, said superior spring element being positioned inside of said upper and extending substantially between said poste-  
rior side and said anterior side.

29. The method of conducting business including making and selling a custom article of footwear according to claim 27, said superior spring element extending between said posterior side and said anterior side for at least fifty percent of the length of said upper.

30. The method of conducting business including making and selling a custom article of footwear according to claim 27, said superior spring element further comprising at least one flex notch.

31. The method of conducting business including making and selling a custom article of footwear according to claim 26, said spring element comprising an inferior spring ele-  
ment.

32. The method of conducting business including making and selling a custom article of footwear according to claim 31, said inferior spring element having an anterior side, posterior side, medial side, lateral side, superior side, inferior side, longitudinal axis, transverse axis, and a flexural axis, said inferior spring element comprising an anterior portion extending between said anterior side of said inferior spring element and an anterior tangent point, a middle portion including an anterior curve extending downwards between said anterior tangent point and a posterior tangent point, and a posterior portion extending upwards between said posterior tangent point and said posterior side of said inferior spring element.

33. The method of conducting business including making and selling a custom article of footwear according to claim 31, said inferior spring element having a medial side and a lateral side and comprising an asymmetrical curved config-  
uration on said medial side relative to said lateral side.

34. The method of conducting business including making and selling a custom article of footwear according to claim 31, said inferior spring element having an anterior side, posterior side, medial side, lateral side, superior side, inferior side, longitudinal axis, transverse axis, and a flexural

axis, said flexural axis deviated from said transverse axis in the range between 10 and 50 degrees.

35. The method of conducting business including making and selling a custom article of footwear according to claim 31, said inferior spring element comprising a tapered config-  
uration.

36. The method of conducting business including making and selling a custom article of footwear according to claim 1, said cushioning means comprising a dampener.

10 37. The method of conducting business including making and selling a custom article of footwear according to claim 1, said sufficient footwear components further comprising a central processing unit for adjusting the cushioning characteristics provided by said article of footwear.

15 38. The method of conducting business including making and selling a custom article of footwear according to claim 1, said sole comprising a midsole.

39. The method of conducting business including making and selling a custom article of footwear according to claim 1, said sole comprising an outsole.

40. The method of conducting business including making and selling a custom article of footwear according to claim 39, said outsole further comprising an anterior outsole element and a posterior outsole element.

20 41. The method of conducting business including making and selling a custom article of footwear according to claim 39, said outsole comprising a backing portion.

42. The method of conducting business including making and selling a custom article of footwear according to claim 41, said backing portion of said outsole comprising at least one upwardly extending stability element.

43. The method of conducting business including making and selling a custom article of footwear according to claim 39, said outsole further comprising a pocket, whereby a portion of said cushioning means is inserted into said pocket and said outsole is thereby at least partially removably affixed in functional relation to said cushioning means.

44. The method of conducting business including making and selling a custom article of footwear according to claim 39, said upper having a superior side and inferior side, said outsole being removably affixed in functional relation to the inferior side of said upper.

45. The method of conducting business including making and selling a custom article of footwear according to claim 1, said article of footwear comprising at least one cushioning element.

46. The method of conducting business including making and selling a custom article of footwear according to claim 1, said upper having a superior side and an inferior side, said sole comprising an outsole including a plurality of traction members, said upper further comprising a plurality of openings on said inferior side, whereby at least a portion of said outsole is removably affixed in functional relation to said upper and said plurality of traction members substantially project through said plurality of openings on said inferior side of said upper.

47. The method of conducting business including making and selling a custom article of footwear according to claim 46, said plurality of traction members each comprising an undercut, whereby said outsole can be mechanically secured in functional relation to said upper.

48. The method of conducting business including making and selling a custom article of footwear according to claim 1, said sufficient footwear components including a heel counter, said heel counter, said upper, said cushioning means, and said sole being removably secured together in functional relation by said fastening means.

49. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein at least five of said sufficient footwear components are removably secured in functional relation with said fastening means.

50. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein the step of securing a plurality of said sufficient footwear components in functional relation with said fastening means is completed in less than five minutes.

51. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein the step of securing a plurality of said sufficient footwear components in functional relation with said fastening means is completed in less than one working day.

52. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein all of the recited steps are substantially completed at a retail store.

53. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein said sufficient footwear components are provided to an address selected by said individual, and the step of securing a plurality of said sufficient footwear components in functional relation with said fastening means is completed by said individual.

54. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein said data is provided by said individual from a remote site using electronic means.

55. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein said data and said information and intelligence is stored in a data storage and retrieval system for future use.

56. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein said data is transmitted electronically over a global communication network.

57. The method of conducting business including making and selling a custom article of footwear according to claim 56, wherein said global communication network comprises the Internet.

58. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein the step of collecting data relating to an individual comprises a means of communication selected from the group consisting of direct spoken word, direct observation and measurement, spoken word using a telephone, key selection using a telephone, written word, letter, facsimile, electronic mail, use of a point of purchase display, use of a computer keyboard, use of a computer touch screen, use of a computer including voice recognition capability, use of a data storage and retrieval system, use of a scanner, use of an imaging device, use of a photograph, use of video.

59. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein said data relating to said individual comprises information selected from the group consisting of said individual's name, mailing address, age, sex, weight, foot length size, foot with size, arch characteristics, preferred athletic activity, performance level, telephone number, electronic mail address, identification number, password, preferred method of payment, preferred method of delivery, and said individual's preferences regarding the selection of said custom article of footwear and components thereof.

60. The method of conducting business including making and selling a custom article of footwear according to claim

1, wherein the step of creating information and intelligence comprises information and intelligence selected from the group consisting of determining said individual's foot length, determining said individuals foot width, determining at least one appropriate footwear last, determining an appropriate three dimensional footwear model, determining a three dimensional footwear pattern, determining at least one appropriate footwear category type, determining at least one appropriate footwear style, determining at least one appropriate footwear sku, determining a plurality of appropriate footwear components and a plurality of variations of a plurality of said footwear components, determining present inventory and location thereof, causing new inventory to be created, determining the most efficient and cost effective location from which to distribute at least one footwear component of said custom article of footwear, determining the most efficient and cost effective location from which to distribute said custom article of footwear.

61. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein the step of providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, comprises providing alternative footwear options selected from the group consisting of alternative footwear product categories, alternative footwear models, alternative footwear skus, alternative footwear colors, alternative footwear materials, alternative footwear components, alternative footwear options using images generated using a computer database, alternative footwear options using at least one actual footwear component, and alternative footwear options using at least one custom article of footwear.

62. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein the step of selecting from the plurality of footwear components sufficient footwear components for making said custom article of footwear comprises providing a capability to said individual selected from the group consisting of providing a data input capability, providing a search capability, providing a selection capability, providing a purchase capability.

63. The method of conducting business including making and selling a custom article of footwear according to claim 1, wherein the step of causing said custom article of footwear to be delivered to a designated address from a physical location comprises a site selected from the group consisting of a company headquarters, a retail store, a sales office, a service center, a medical office, a factory, a vending machine, a warehouse and distribution center.

64. The method of conducting business including making and selling a custom article of footwear according to claim 1, said fastening means comprising a mechanical means.

65. The method of conducting business including making and selling a custom article of footwear according to claim 1, said fastening means comprising mechanical means and self-adhesive means.

66. The method of conducting business including making and selling a custom article of footwear according to claim 1, said fastening means comprising self-adhesive means.

67. A method of conducting business including making and selling footwear components for making a custom article of footwear comprising the steps of:  
68. collecting data relating to an individual;  
69. creating from said collected data information and intelligence for making said custom article of footwear;

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providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, a plurality of said footwear components including fastening means; selecting from the plurality of footwear components sufficient footwear components for making said custom article of footwear having an anterior side, a posterior side, a medial side, a lateral side, and comprising at least an upper, a sole, and cushioning means affixable together in functional relation by said fastening means; providing said information and intelligence and said sufficient footwear components to a physical location at which said sufficient footwear components for making said custom article of footwear can be distributed; and, causing said sufficient footwear components for making said custom article of footwear to be delivered to a designated address, whereby a plurality of said sufficient footwear components are secured in functional relation with said fastening means and the assembly for making said custom article of footwear is completed.

68. A method of conducting business including selling at least one footwear component for making a custom article of footwear having an anterior side, a posterior side, a medial side, a lateral side, and comprising at least an upper, a sole, and cushioning means affixable together in functional relation comprising the steps of:

collecting data relating to an individual; creating from said collected data information and intelligence for providing said at least one footwear component for use in making said custom article of footwear, providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, a plurality of said footwear components including fastening means; selecting from said plurality of footwear components said at least one footwear component for making said custom article of footwear; providing said information and intelligence regarding said at least one footwear component to a physical location, at which said at least one footwear component for making said custom article of footwear can be distributed; and, causing said at least one footwear component for making said custom article of footwear to be delivered to a designated address, whereby a plurality of footwear components comprising sufficient footwear components for making said custom article of footwear including said at least one footwear component are secured in functional relation with said fastening means and the assembly for making said custom article of footwear is completed.

69. A method of conducting business with the use of a vending device for selling at least one footwear component for use in making a custom article of footwear having an anterior side, a posterior side, a medial side, a lateral side, and comprising at least an upper, a sole, and cushioning means affixable together in functional relation comprising the steps of:

collecting data relating to an individual; creating from said collected data information and intelligence for providing said at least one footwear component for use in making said custom article of footwear, providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, a plurality of said footwear components including fastening means;

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selecting from the plurality of footwear components said at least one footwear component for making said custom article of footwear; providing said information and intelligence regarding said at least one footwear component to a physical location at which said at least one footwear component for making said custom article of footwear can be distributed; and, causing said at least one footwear component for use in making said custom article of footwear to be delivered to a designated address, whereby a plurality of footwear components comprising sufficient footwear components for making said custom article of footwear including said at least one footwear component are secured in functional relation with said fastening means and the assembly for making said custom article of footwear is completed.

70. A method of conducting business with the use of a vending device for selling at least one footwear component for use in making a custom article of footwear according to claim 69, wherein the step of collecting data relating to an individual comprises a means of communication selected from the group consisting of direct spoken word, direct observation and measurement, spoken word using a telephone, key selection using a telephone, written word, letter, facsimile, electronic mail, use of a point of purchase display, use of a computer keyboard, use of a computer touch screen, use of a computer including voice recognition capability, use of a data storage and retrieval system, use of a scanner, use of an imaging device, use of a photograph and use of video.

71. A method of conducting business with the use of a vending device for selling at least one footwear component for use in making a custom article of footwear according to claim 69, wherein said data relating to said individual comprises information selected from the group consisting of said individual's name, mailing address, age, sex, weight, foot length size, foot width size, arch characteristics, preferred athletic activity, performance level, telephone number, electronic mail address, identification number, password, preferred method of payment, preferred method of delivery, and said individual's preferences regarding the selection of said custom article of footwear and components thereof.

72. A method of conducting business with the use of a vending device for selling at least one footwear component for use in making a custom article of footwear according to claim 69, wherein the step of creating information and intelligence comprises information and intelligence selected from the group consisting of determining said individual's foot length, determining said individual's foot width, determining at least one appropriate footwear last, determining an appropriate three dimensional footwear model, determining a three dimensional footwear pattern, determining at least one appropriate footwear category type, determining at least one appropriate footwear style, determining at least one appropriate footwear sku, determining a plurality of appropriate footwear components and a plurality of variations of a plurality of said footwear components, determining present inventory and location thereof, causing new inventory to be created, determining the most efficient and cost effective location from which to distribute at least one footwear component of said custom article of footwear, determining the most efficient and cost effective location from which to distribute said custom article of footwear.

73. A method of conducting business with the use of a vending device for selling at least one footwear component for use in making a custom article of footwear according to

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claim 69, wherein the step of providing a plurality of footwear components, and a plurality of variations of a plurality of said footwear components, comprises providing alternative footwear options selected from the group consisting of alternative footwear product categories, alternative footwear models, alternative footwear skus, alternative footwear colors, alternative footwear materials, alternative footwear components, alternative footwear options using images generated using a computer database, alternative footwear options using at least one actual footwear component, and alternative footwear options using at least one custom article of footwear.

74. A method of conducting business with the use of a vending device for selling at least one footwear component for use in making a custom article of footwear according to claim 69, wherein the step of selecting from the plurality of footwear components sufficient footwear components for

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making said custom article of footwear comprises providing a capability to said individual selected from the group consisting of providing a data input capability, providing a search capability, providing a selection capability, providing a purchase capability.

75. A method of conducting business with the use of a vending device for selling at least one footwear component for use in making a custom article of footwear according to claim 69, wherein the step of causing said custom article of footwear to be delivered to a designated address from a physical location comprises a site selected from the group consisting of a company headquarters, a retail store, a sales office, a service center, a medical office, a factory, a vending machine, a warehouse and distribution center.

\* \* \* \* \*

**Evidence Appendix D (37 C.F.R. § 41.37(c)(1)(ix))**

**Originally-Filed Specification**

The Original Specification was originally made part of the record when it was filed on March 14, 2002 by the Appellants.

**CUSTOM FIT SALE OF FOOTWEAR**

- [01] This application is related to U.S. Patent No. 5,714,098 to Daniel R. Potter, issued February 3, 1998, which patent is incorporated entirely herein by reference. This application is also related to U.S. Patent No. 5,879,725 to Daniel R. Potter, issued March 9, 1999, which patent is incorporated entirely herein by reference as well.

**FIELD OF THE INVENTION**

- [02] The invention relates to the sale of custom-fitted footwear. More particularly, the invention relates to a method and data structure for selling footwear to individual customers. With the invention, a customer selects footwear based upon the last used to manufacture the footwear, so that the customer obtains footwear custom-fitted for the customer's feet.

**BACKGROUND OF THE INVENTION**

- [03] Consistently obtaining footwear that fits properly has long been a problem for footwear customers. Similarly, footwear manufacturers have long sought to ensure that customers receive properly fitting footwear, in order to maintain their customers' satisfaction. Even with modern technology, however, this goal has proven elusive. One problem with sizing footwear is that different models of footwear are typically manufactured using different lasts. Even if two different models of footwear are made by the same manufacturer and are labeled as the same size, they may still have different shapes. Thus, a customer who may be comfortable with the fit of a first model of footwear in, for example, a size 9 length and a size D width may not enjoy the fit of a second, different model of footwear having the same length and width sizes. For that second model of footwear, the customer may instead find that a size 8½ length and size E width provides the most comfortable fit.
- [04] Because of this inconsistency in the sizing of footwear, many potential footwear customers are reluctant to buy footwear without trying it on first to ensure a proper fit.

These customers will not purchase footwear through the mail, by telephone, over the Internet, or through any other form of remote communication. Unfortunately, shoe manufacturers cannot make their footwear physically available in all possible models and sizes to all potential customers. For footwear manufacturers that offer even a small range of footwear models, the cost of providing a sample of each model in each size to every footwear retailer would be prohibitively expensive. Further, most footwear retailers would not have the space to store and display a sample of each footwear model in each available size for more than a handful of footwear manufacturers. As a result, most shoe manufacturers lose an unknown number of potential footwear sales each year, simply because customers cannot physically try on a desired model of footwear before purchase. Moreover, many of those customers who do purchase footwear remotely receive footwear that does not properly fit, and are dissatisfied with their purchases.

#### BRIEF SUMMARY OF THE INVENTION

- [05] Advantageously, the present invention provides a method whereby a customer may purchase footwear through a remote communication channel, and be assured that the purchased footwear will properly fit upon delivery. According to the invention, a customer purchases footwear by specifying the last that is used to construct the footwear. A customer may identify a particular last based upon careful measurement of the customer's feet. A customer may also identify a last based upon previous experience with footwear that was constructed using the last.
- [06] A customer may directly specify a last according to, for example, a last model number alone or a last model number in combination with a particular last size. Alternately, or additionally, the shoe provider may employ a data structure to correlate a customer's identity with one or more particular lasts that provide properly fitting shoes for the customer. The customer can then inherently select a particular last used to construct the footwear by providing his or her identity when ordering the model of desired

footwear. By explicitly or inherently designating the last from which the footwear is constructed, the customer can ensure that the footwear is constructed to properly fit.

#### BRIEF DESCRIPTION OF THE DRAWINGS

- [07] Fig. 1 illustrates a shoe distribution center for providing shoes to a plurality of customers according to one embodiment of the invention.
- [08] Fig. 2 shows a method for providing custom-fitted shoes according to one embodiment of the invention.
- [09] Figs. 3A-3C illustrate information contained in orders for custom-fitted shoes according to various embodiments of the invention.
- [10] Fig. 4 illustrates a shoe distribution center for providing shoes to a plurality of customers according to another embodiment of the invention.
- [11] Fig. 5 shows a customer/last database according to an embodiment of the invention.

#### DETAILED DESCRIPTION OF THE INVENTION

- [12] Fig. 1 illustrates a shoe distribution center 101 for providing shoes to a plurality of customers 103. As seen in this figure, the customers 103 can communicate with the distribution center 101 using one or more of a variety of remote communication channels, so that the customers 103 do not have to be physically present at the distribution center 101. Customer 103A, for example, may order shoes from the distribution center 101 by a parcel service 105, such as the U.S. Postal Service, United Parcel Service (UPS), Federal Express, or any other suitable parcel service. Customer 103B may submit an order for footwear to the distribution center 101 using a telephone service 107. As will be appreciated by those of ordinary skill in the art, the telephone service may be an ordinary PSTN telephone service, a wireless telephone service, or any combination thereof. Further, the customer 103B may submit the order

using voice instructions (either to a person or to a recording device), or transmit written ordering instructions using a facsimile machine.

- [13] Some customers, such as customer 103C, may order footwear from the distribution center 101 via an electronic communication network 109. Perhaps the most well known example of such an electronic communication network 109 that may be used to order footwear from the distribution center 101 is the Internet, but those of ordinary skill in the art will appreciate that other network arrangements, such as intranets, local area networks, or other types of wide area networks may also be employed by customer 103C to order footwear from the footwear distribution center 101.
- [14] With this arrangement, the footwear distribution center 101 may provide the customer with one or more pages written in a markup language, such as the Hypertext Markup Language (HTML) or the Extensible Markup Language (XML) (i.e., a Website). The pages may, for example, display various footwear models currently available from the distribution center 101, along with ordering information instructing the customer 103C on the procedure to order footwear from the distribution center 101. The pages may also include one or more interactive questionnaires requesting ordering information from the customer 103C. Such information will typically include the customer's shipping address, billing information, and the footwear model desired by the customer. The questionnaires will also request the customer 103C to directly or indirectly specify the last used to manufacture the footwear, as will be explained in detail below. Using a computer with a software program for viewing the pages (i.e., a browser), the customer 103C can then select and order a particular model of footwear from the distribution center 101 by responding to the questionnaires over the communication network 109.
- [15] Other customers, such as customer 103D, may instead order footwear from the distribution center 101 through an electronic mail service 111. Of course, those of ordinary skill in the art will appreciate that the electronic mail service 111 can be implemented using an electronic communication network 109 as described above.

The electronic mail service 111 may also be implemented using, for example, a direct communication connection with the distribution center 101 through a telephone call to the distribution center using a modem.

- [16] Still other customers may use another communication channel that permits a customer to remotely order footwear from the footwear distribution center 101. In fact, those of ordinary skill in the art will appreciate that various embodiments of the invention may be implemented using any combination of desired remote communication channels.
- [17] It will also be appreciated by those of ordinary skill in the art that the information used to order footwear may be obtained from any suitable source. As noted above, for example, a customer 103C may view ordering information provided on HTML pages through the communications network 109. Alternately, a customer may obtain ordering information through print advertisements, catalogs, television, or any other suitable source. The ordering information may include, for example, the footwear models available at the distribution center 101, the color schemes available for each model, price, or other characteristics of the footwear. Further, the ordering information may include customizing information, such as names or images that are available to be custom-applied to the footwear being ordered.
- [18] Turning now to the footwear distribution center 101, the center 101 includes a footwear order-receiving unit 113, which receives the footwear orders from customers 103 provided through the remote communication channels, and a footwear supply unit 115, which supplies footwear according to the customers' orders. More particularly, the footwear supply unit 115 includes a footwear inventory 117 containing one or more models of footwear in a variety of sizes, and a footwear manufacturing unit 121. The footwear manufacturing unit 121 has a last inventory 121 containing a plurality of lasts in different sizes, and a heating unit 123 for heating the lasts to modify footwear from the footwear inventory 117, as will be explained in detail below.
- [19] As previously noted, the footwear order-receiving unit 113 receives the footwear orders from customers 103. The order-receiving unit 113 may include a number of

different components, depending upon the remote communication channels supported by the distribution center 101. For example, if the distribution center 101 communicates with customers 103 through an electronic communication network 109 (such as the Internet), then the receiving unit 113 may include fully automated components for processing a customer's order. These components of the receiving unit 113 may be embodied, for example, by a server computer that receives footwear orders from the customer 103C and relays those orders on to the footwear supply unit 115. Similarly, if the footwear distribution center 101 supports remote communication with customers 103 through a telephone service 107, the order receiving unit 113 may include a fully automated voice menu system that allows customer 103B to order footwear using a telephone handset keypad or voice instructions in response to a series of audible prompts. If the operation of the footwear supply unit 115 is fully automated, then the customer 113 may order footwear without human intervention.

- [20] If the distribution center 101 supports communication channels that require a human interpretation of messages, then the order-receiving unit 113 will include human personnel. For example, with some embodiments of the footwear distribution center 101, the order-receiving unit 113 includes an operator to receive and understand voice instructions from a customer 103B over the telephone system 107. If the distribution center 101 receives written communications from customers 103 via a parcel system 105 or electronic mail system 111, then the order receiving unit 113 will include human readers to read and interpret footwear orders conveyed in the mail messages from the customers 103.
- [21] Referring back to the footwear supply unit 115, the footwear inventory 117 contains at least one model of footwear in a variety of sizes. As is known in the art, each pair of footwear is formed using a last, which defines the shape of the footwear. Additionally, the interior of each pair of footwear incorporates a moldable fit-component that allows each shoe to be remolded to lengths and widths differing from its original length and width. The last inventory 121 then includes a number of heatable lasts or mold cores that can be used to remodel the length and width of the

footwear in footwear inventory 117 to the length and width of the heatable last. In this manner, the shape of each piece of footwear in the footwear supply unit 115 can be resized using a last from the last inventory 121.

- [22] Preferably, the footwear inventory 117 includes the model of footwear in intermediate size increments. The last inventory 121 then includes lasts for molding footwear to length and width sizes that are not represented in the inventory 117. With one embodiment of the invention, for example, the footwear inventory 117 includes at least one style of stock shoes in relatively small size increments (e.g., standard half sizes) over a wide range of lengths. Thus, the stock shoes may range from length size 6 to size 14, and in full size increments for length sizes between 14 and 20. The stock shoes all have the same width (e.g., size "C"), or have one or more different widths for each length. The last inventory 121 then includes lasts for each desired length and width size increment (e.g., each  $\frac{1}{4}$  length size increment for lengths ranging from size 6 to  $13\frac{1}{2}$  and each  $\frac{1}{2}$  length size increment for lengths ranging from size  $13\frac{1}{2}$  to 20, and each width increment for width sizes D, E and EE). The features and operation of such a footwear supply unit 115 are described in more detail in U.S. Patent Nos. 5,714,098 and 5,879,725 to Daniel R. Potter, which were incorporated entirely herein by reference above.
- [23] With this arrangement, the footwear supply unit 115 can thus produce footwear in a variety of desired sizes by using a specific last size. For example, with the above embodiment, if a customer ordered a particular model of shoes with a length of size  $8\frac{1}{2}$  and a width of size "C," the footwear inventory 117 already includes footwear manufactured with a last of that shape. Thus, the footwear supply unit 115 could supply the ordered shoes directly out of the footwear inventory 117. On the other hand, if a customer ordered a particular model of shoes with a length of size  $8\frac{1}{2}$  and a width of size "E," the footwear supply unit 115 could supply the shoes by reforming stock shoes (from the footwear inventory 117) with a last of size  $8\frac{1}{2}$  and a width of size "E" (from the last inventory 121).

- [24] With some embodiments of the invention, the lasts in the last inventory 121 have the same overall shape as the lasts used to make the stock shoes in the footwear inventory 117. By using the same last (that is, the same last shape) to both initially construct shoes in the footwear inventory 117 and subsequently modify these shoes, a customer may easily determine a properly fitting shoe size for a particular model of shoe. For example, a customer may know that, with a last of shape A, a properly fitting shoe will have a length of size 8½ and a width of size "E," whereas, with a last of shape B, a properly fitting shoe will a length of size 8½ and a width of size "C." If the lasts in the last inventory 121 and the lasts used to make the stock shoes in the footwear inventory 117 both include lasts of the same shape (for example, lasts of shape B), by specifying a particular last (that is, by specifying a last of a particular shape and size), a customer can confidently order custom-fitted footwear that will fit properly. Thus, with the above example, the customer will know that, when ordering a shoe constructed with the last of shape B, to order footwear with a length of size 8½ and a width of size "C," rather than a length of size 8½ and a width of size "E."
- [25] Of course, other embodiments of the invention may employ differently shaped lasts to construct the footwear in footwear inventory 117 than are stored in last inventory 121. With these embodiments, the footwear inventor 117, may, for example, keep a greater number of lasts with smaller size increments in the last inventory 121 than the previously described embodiments. Thus, the last inventory 121 may include lasts for each ¼ size increment from size 6 to 13½ and each ½ length size increment for lengths ranging from size 13½ to 20, and each width increment for width sizes D, E and EE. With these embodiments, if a customer orders a shoe manufactured with a particular last, the footwear supply unit 115 will be able to modify a stock shoe from the footwear inventory 117 with the desired last from the last inventor 121, even if the stock shoe had originally been manufactured with a differently shaped last.
- [26] With some embodiments of the invention, the footwear supply unit 115 may include footwear constructed with differently shaped lasts, while the last inventory 121 may include a variety of differently shaped lasts. For these embodiments, a last identifier

can be used to uniquely identify each last employed to manufacture each item of footwear in the footwear inventory 117. The last identifier can also be used to uniquely identify each last in the last inventory 121. With this arrangement, a last identifier will identify a particular last by its overall shape, length, width, and any other relevant size information. Identifying each last with a unique last identifier allows a customer 103 to order footwear constructed with a specific last that will ensure that the footwear will fit properly. For example, the customer may specify that a particular last from the last inventory 121 to be used to reform the size of a shoe in the footwear inventory 117. Alternately, the customer may order existing footwear from the footwear inventory 117 based upon the last that was used to manufacture the footwear.

- [27] A variety of different formats may be employed for the last identifier. For example, the last identifier may be a single alphanumeric value that uniquely identifies a last. Thus, the number "128.255" may identify a last of a particular shape indicated by the number "12," having a length of size 8 $\frac{1}{4}$ , and a width of size "E" (the fifth letter in the alphabet). Alternately, the last identifier may be made up of a number of discrete portions, each corresponding to a particular characteristic of a last. Thus, the same last discussed in the previous example may be identified by the last identifier "Last 12, length 8 $\frac{1}{4}$ , width E."
- [28] Still further, if the same last shape is used to manufacture every size of a particular model of footwear, then that model of footwear can be used to inherently identify the last shape as part of the last identifier. For example, if every size of a footwear model "Air Potter" is originally constructed or reformed with the last of the particular shape indicated in the previous examples by the number "12," then the last identifier may be "Air Potter, length 8 $\frac{1}{2}$  width E." Of course, those of ordinary skill in the art will appreciate that still other formats can be used to uniquely identify a last.
- [29] The operation of the distribution center 101 will now be described with reference to the method illustrated in Fig. 2. First, in step 201, the order-receiving unit 113

receives an order 301 for footwear from a customer 103. As noted above, the order 301 may be received using any remote communication channel supported by the distribution center 101, including channels using a parcel system 105, a telephone system 107, an electronic communication network 109 (for example, the Internet), an electronic mail system 111, or any other suitable remote communication channel.

- [30] With some embodiments of the invention, the order 301 includes the ordering information shown in Fig. 3A. More particularly, the footwear order 301 includes a footwear model selection 303, designating the particular model of footwear from the footwear inventory 117 desired by the customer 103. The footwear model selection 303 may include, for example, the model type and a desired color scheme. The order 301 also includes a last identifier 305 to uniquely identify the last by which the customer 103 wishes to have the ordered shoes manufactured. The last identifier 305 identifies both the last shape and the last size, as noted above. Still further, the order may contain additional relevant information, such as, for example, a name, initials or an image to be custom-applied to the ordered footwear.
- [31] As also previously noted, with other embodiments of the invention the footwear model may inherently identify a single last shape. With these embodiments, the order 301 will include footwear model and size information, as shown in Fig. 3B. That is, the order 301 will include the footwear model selection 303, length size information 307, and width size information 309. This information together defines the particular last size and shape used to construct the ordered footwear.
- [32] In step 203, the distribution center 101 determines if the footwear inventory 117 includes the footwear specified in the order 301. More particularly, the distribution center 101 determines if the footwear inventory 117 contains footwear that has already been manufactured with the last specified in the order 301. It should be noted that this determination may be made by the order-receiving unit 117 upon receiving an order 301 from a customer 103, or by the footwear supply unit 115 after receiving a customer's order 301 relayed by the order-receiving unit 117.

- [33] If the footwear is in the footwear inventory 117, then the distribution center 101 provides the footwear to the customer 103 directly from the footwear inventory 117 in step 207. If the footwear specified in the order 301 is not a size carried in the footwear inventory 117, then, in step 205, the footwear is manufactured in the footwear supply unit 115 using the last identified in the order 301. That is, the last specified in the order 301 is selected from the last inventory 121, and used to modify the size of footwear already included in the footwear inventory 117. As noted above, this operation is discussed in detail in U.S. Patent Nos. 5,714,098 and 5,879,725 to Daniel R. Potter, which were incorporated entirely herein by reference above. Once the footwear has been remolded to comply with the customer's order, then the distribution center 101 provides the footwear to the customer 103 in step 207.
- [34] It should be noted that the distribution center 101 can provide the ordered footwear to the customer 103 in step 207 using any suitable shipping method. For example, the distribution center 101 can mail the custom-fitted footwear directly to an address provided by the customer through a parcel service, such as the U.S. Postal Service, Federal Express, or United Parcel Service. Alternately, the distribution center 101 can ship the ordered footwear to a retail store, such as a store associated with the shoes' manufacturer. The customer 103 can then pick up the ordered footwear in person from retail store. The customer 103 may select the appropriate retail store from a list of available retail stores, or may simply allow the distribution center 101 to determine the closest retail store to the customer. Of course, still other techniques for shipping the ordered footwear to the customer will be apparent to those of ordinary skill in the art.
- [35] By using the distribution center 101 described above, a customer 103 need only identify a particular last that the customer knows will provide properly fitting footwear to confidently obtain custom-fitted footwear. As will be appreciated by those of ordinary skill in the art, a customer can determine which particular last or lasts that will provide properly fitting footwear in a variety of ways. A customer 103 may, for example, initially try on a variety of footwear to identify a particular last that, when

used to manufacture a shoe, offers the best fit for the customer. After trying on a variety of footwear once to determine a suitable last, the customer need not try on footwear again, but may instead simply order footwear made with the particular last. Alternately, the customer 103 may employ a measurement process, such as a digital scan of the customer's feet, to determine an appropriate last that will provide the customer with properly fitting shoes. Regardless of the method of identifying the lasts that will provide custom-fitting footwear, once the customer 103 has identified the lasts, the customer 103 can employ the distribution center 101 to order footwear by referring to that last.

- [36] Yet another embodiment of the invention is illustrated in Fig. 4. In this figure, the distribution center 101 includes a customer/last database 125. As shown in Fig. 5, this customer/last database 125 includes a table associating each customer 103 with at least one last that will provide the customer with custom fitting shoes. For example, in the table, the customer 103A is associated with the last specified by the last identifier 128.255. Thus, the database 125 contains one or more records, with each record having a customer field identifying a customer and at least one last field identifying a last that will provide the customer with custom fitting footwear. With the customer/last database 125, the customer can omit providing a last identifier when ordering footwear. Instead, the customer need only identify himself or herself. The distribution center 101 can then use the customer/last database 125 to identify a particular last that will provide custom-fitted footwear for that customer, and manufacture the ordered footwear using the last corresponding to the customer. Thus, with this embodiment, the customer's order 301 may include only the footwear model selection 303 and the customer identification 311 as shown in Fig. 3C. As will be appreciated by those of ordinary skill in the art, the customer/last database 125 may be implemented using a software database, a written or printed table, or any other suitable medium for storing customer identity and last information.
- [37] In addition to storing customer identity and last information, the customer/last database 125 may also store any other type of information that may be useful to the

customer or a shoe manufacturer associated with the distribution center 101. For example, for customers who are growing children, the customer/last database 125 may further store the age of the customer. This will allow the shoe manufacturer associated with the distribution center 101 to compile information for foot morphology studies regarding growth patterns, sizing information for specific age groups, and other footwear related projects.

- [38] Of course, those of ordinary skill in the art will appreciate that more than one last can provide a customer with custom-fitting footwear. Thus, with some embodiments of the invention, a customer may identify two or more lasts that will provide him or her with properly fitting footwear. The customer/last database 125 can then associate each last with that customer, and the distribution center 101 can determine which last to use when manufacturing shoes for the customer. For example, the customer may identify a first last that provides the customer properly fitting footwear when used to construct (or remold) hiking boots, and another, second last that provides the customer with properly fitting footwear when used to construct (or remold) basketball shoes. If the customer orders basketball shoes, the distribution center 101 will determine that the shoes should be remolded using the second last rather than the first last. Alternately, the customer can specify which of the suitable lasts should be used to construct or remold ordered footwear.
- [39] In addition, those of ordinary skill in the art will appreciate that a customer 103 can specify different lasts for the left and right shoes in a pair of footwear. For example, a customer may find that a shoe manufactured with a particular shape or size of last best fits his or her left foot, while a shoe manufactured with another shape or size of last best fits his or her right foot. Accordingly, various embodiments of the invention may allow a customer 103 to order footwear manufactured with different lasts used to manufacture the left and right shoes. Still further, with various embodiments of the invention, the customer/last database 125 can associate different lasts with a customer's left and right feet.

- [40] While the invention has been described with respect to specific examples including presently preferred modes of carrying out the invention, those skilled in the art will appreciate that there are numerous variations and permutations of the above described systems and techniques that fall within the spirit and scope of the invention as set forth in the appended claims.

100-00033-14

What is claimed is:

1. A method of providing footwear, comprising:  
receiving a request from a customer for footwear;  
determining at least one last associated with the customer for manufacturing the  
footwear; and  
providing the customer with the footwear after the footwear has been manufactured  
with the at least one last.
  
2. The method of providing footwear recited in claim 1, wherein the request identifies  
the last associated with the customer.
  
3. The method of providing footwear recited in claim 1, wherein  
the request provides an identity for the customer, and  
the identity provided in the request is used to determine the last associated with the  
customer.
  
4. The method for providing footwear recited in claim 1, further including using the  
last to reform a shape of an interior of the footwear before providing the footwear to the  
customer.
  
5. The method for providing footwear recited in claim 4, wherein the last is used to  
reform a length of the interior of the footwear.
  
6. The method for providing footwear recited in claim 4, wherein the last is used to  
reform a width of the interior of the footwear.
  
7. The method for providing footwear recited in claim 6, wherein the last is used to  
also reform a length of the interior of the footwear.

8. The method for providing footwear recited in claim 1, further including using the last to construct the footwear from material pieces.

9. The method for providing footwear recited in claim 1, further including determining a first last associated with the customer for manufacturing a left shoe, and determining a second last associated with the customer for manufacturing a right shoe; and providing the customer with the footwear after the left shoe of the footwear has been manufactured with the first last and the right shoe of the footwear has been manufactured with the second last.

10. A shoe distribution center, comprising:

- an order receiving unit which receives orders for custom fitting footwear which identify at least one last;
- a footwear inventory containing one or more pieces of footwear in a variety of sizes, such that the interior of each piece of footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear's original length and width; and
- a footwear manufacturing unit for remolding lengths and widths of pieces of footwear in the footwear inventory using lasts identified in orders received by the order receiving unit.

11. The shoe distribution center recited in claim 10, wherein the footwear manufacturing unit includes:

- a last inventory containing a plurality of lasts that can be used to remodel lengths or widths of at least some of the pieces footwear in the footwear inventory; and
- a heating unit for heating the lasts to remodel lengths or widths of at least some of the pieces footwear in the footwear inventory.

12. The shoe distribution center recited in claim 10, wherein the order-receiving unit includes a server computer for receiving orders for custom fitting footwear over an electronic communication network.

13. The shoe distribution center recited in claim 10, wherein the order-receiving unit includes an automated voice menu system for receiving orders for custom fitting footwear over a telephone service.

14. The shoe distribution center recited in claim 10, further comprising:  
a customer/last database containing one or more customer records, such that each record includes a customer field identifying a customer and at least one last field identifying a last associated with the customer.

### CUSTOM FIT SALES OF FOOTWEAR

#### Abstract of the Invention

A method whereby a customer may purchase footwear through a remote communication channel, and be assured that the purchased footwear will properly fit upon delivery. The customer purchases footwear by designating the last that is used to construct the footwear. A customer may identify a particular last based upon careful measurement of the customer's feet. A customer may also identify a last based upon previous experience with footwear constructed using the last.

Footwear Order Receiving Unit 113

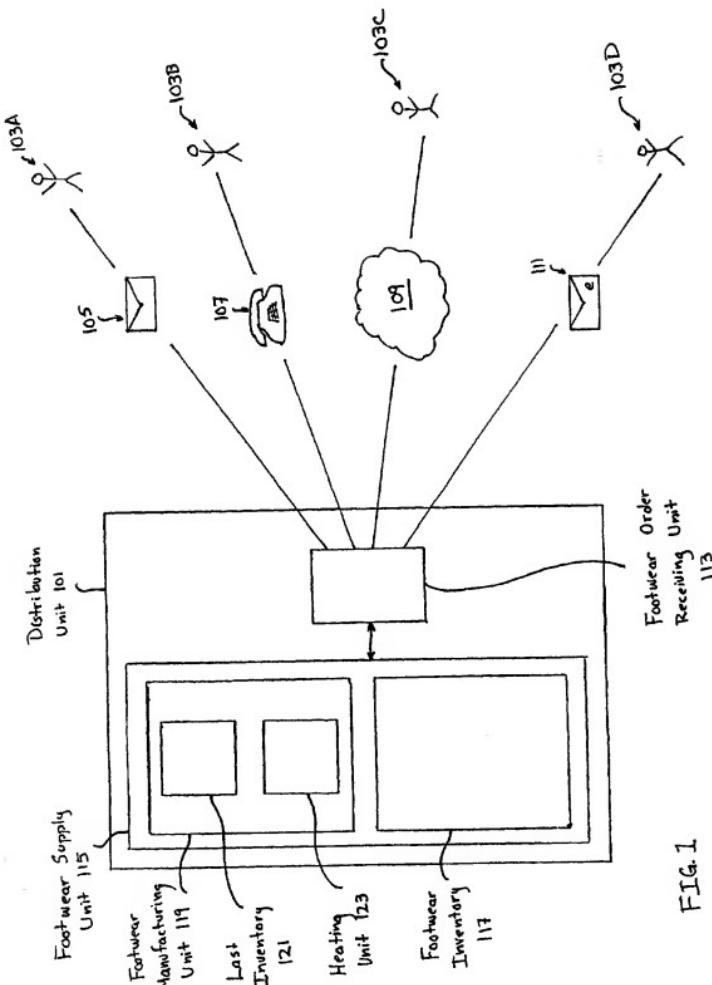
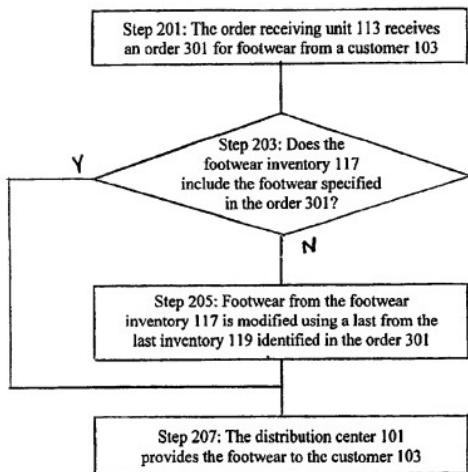


FIG. 1



**FIG. 2**

Customer 103A	128.255
Customer 103B	68.004
Customer 103C	Last 14, Length 9½, Width EE
Customer 103D	109.50
:	:

**FIG. 5**

Footwear Model Selection
Last Identifier

**FIG. 3A**

Footwear Model Selection
Length Size
Width Size

**FIG. 3B**

Footwear Model Selection
Customer Identifier

**FIG. 3C**

Footwear Supply Unit 115  
Customer Last Database 125

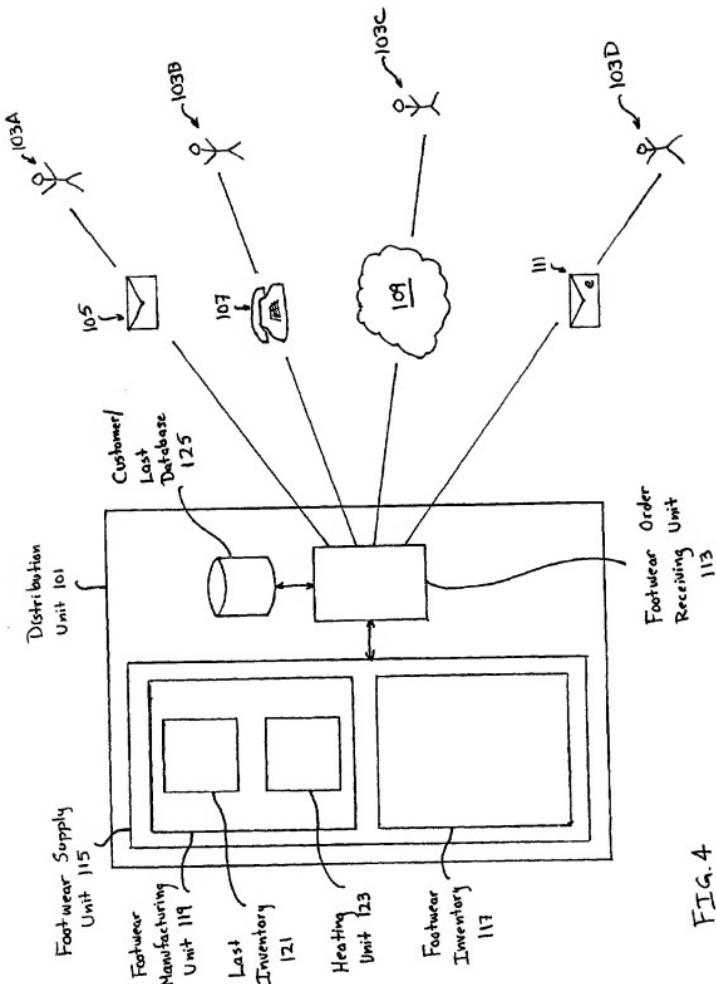


FIG. 4

**Evidence Appendix E (37 C.F.R. § 41.37(c)(1)(ix))**

**March 12, 2007 Non-final Office Action**

This reference was originally made part of the record by the U.S. Patent Office as a Non-Final Office Action issued by Examiner Andrew Rudy on March 12, 2007.



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Case Ref. 005127-00033  
Action Resp. 3 mo DA  
Due Date 5/12/07  
Last Day 5/12/07  
By JMH

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/099,685	POTTER ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Andrew Joseph Rudy	3627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
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A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 22 December 2006.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 10-14 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date, \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. Claims 1-14 are pending. Claims 1-9 are still withdrawn from consideration as being drawn to a non-elected invention.
2. The December 22, 2006 Rejection is withdrawn. Again, the Examiner regrets the lack of compact prosecution.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
  - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolveen et al. US 6,246,994.

Wolveen discloses a distribution center, e.g. Figs. 1-4B, comprising at least one identified article, and an order receiving unit, e.g. 20, and inventory, e.g. information on the individual. Wolveen does not disclose a shoe last. Official Notice is taken that shoe distribution centers associated with customer last orders for footwear has been common knowledge in the shoe distribution art. To have provided such with the custom ordering system of Wolveen would have been

obvious to one of ordinary skill in the art. The motivation for having done such would have been to facilitate well known shoe sale commerce to increase sales.

5. Further pertinent references of interest are noted on the attached PTO-892.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Joseph Rudy whose telephone number is 571-272-6789. The examiner can normally be reached on Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ryan M. Zeender can be reached on 571-272-6790. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Andrew Joseph Rudy  
Primary Examiner  
Art Unit 3627

<b>Notice of References Cited</b>		Application/Control No.	Applicant(s)/Patent Under Reexamination
		10,099,685	POTTER ET AL.
Examiner		Art Unit	Page 1 of 1
Andrew Joseph Rudy		3627	

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-5,339,252	08-1994	White et al.	700/98
*	B US-5,783,810	07-1998	Kelly, Jr., Gerald F.	235/385
*	C US-5,793,030	08-1998	Kelly, Jr., Gerald F.	235/385
*	D US-6,246,994	06-2001	Wohlen et al.	705/14
*	E US-6,341,266	01-2002	Braun, Heinrich	705/7
*	F US-6,853,981	02-2005	Radosevich et al.	705/27
*	G US-6,879,945	04-2005	Cook, Christopher Simon	703/2
*	H US-7,062,454	06-2006	Giannini et al.	705/27
*	I US-7,089,152	08-2006	Oda et al.	702/182
J	US-			
K	US-			
L	US-			
M	US-			

**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
N					
O					
P					
Q					
R					
S					
T					

**NON-PATENT DOCUMENTS**

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)		
U			
V			
W			
X			

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

**Evidence Appendix F (37 C.F.R. § 41.37(c)(1)(ix))**

**September 11, 2007 Request For Reconsideration**

This reference was originally made part of the record by the Appellants on September 11, 2007.

Atty. Docket No.  
005127.00033

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Patent Application of:  
**Daniel R. Potter, et al.**

Application No.: 10/099,685

Filed: March 14, 2002

For: Custom Fit Sale of Footwear

Examiner: Andrew J. Rudy  
Group Art Unit: 3627  
Confirmation No.: 4915

**REQUEST FOR RECONSIDERATION**

Honorable Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

Applicants respectfully request reconsideration of this application and the Office Action dated March 12, 2007.

Claims 1-14 are pending in this application, but claims 1-9 have been withdrawn from further consideration. Accordingly, only claims 10-14 remain under active consideration in this application. In the Office Action, the Examiner rejected claims 10-14 under 35 U.S.C. § 103(a) based on U.S. Patent No. 6,246,994 to Wolven, et al. (hereinafter “Wolven”). See the March 12, 2007, Office Action at pages 2-3. Applicants respectfully traverse this rejection and request that it be withdrawn.

Applicants’ claim 10 recites a shoe distribution center that includes: (a) an order receiving unit that receives orders from customers for footwear to custom fit the customer, wherein each order identifies at least one last; (b) a footwear inventory containing a plurality of pieces of footwear in a variety of sizes, wherein an interior of each piece of footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear’s original lengths and widths; and (c) a footwear manufacturing unit for remolding lengths

and widths of pieces of footwear in the footwear inventory using lasts identified in the orders received by the order receiving unit. Wolven does not teach or suggest the claimed shoe distribution center.

In rejecting all of Applicants' claims as allegedly rendered obvious from the disclosure of Wolven, the Office acknowledged that Wolven does not disclose at least one of the claimed features of Applicants' invention, namely, a shoe last. *See* the March 12, 2007, Office Action at page 2. Without any supporting evidence, the Office simply concludes that the claimed invention is obvious through the following statement:

Official Notice is taken that shoe distribution centers associated with customer last orders for footwear has [sic.] been common knowledge in the shoe distribution art.

*Id.* at page 2. Applicants respectfully assert that there is no evidence of record to support this assertion of fact, and/or there is no basis for taking "Official Notice" under the circumstances of this case. More specifically, there is no evidence of record to indicate that shoe lasts are used in any manner in a custom footwear ordering, manufacturing, and distributing center, *e.g.*, of the types recited in Applicants' claim 10. There also is no reasonable basis for concluding that this asserted "fact" is "common knowledge" in the industry. Pursuant to the procedure for taking "Official Notice" as set forth in *The Manual of Patent Examining Procedure* § 2144.03C, Applicants respectfully request that the Office provide documentary or other appropriate evidence to support the taking of Official Notice in this case.

The deficiencies of the Wolven patent *vis-à-vis* Applicants' claims, however, do not end with the acknowledged absence of a last. Several features of Applicants' claims are not taught or suggested in the Wolven patent. For example, Applicants' claim 10 recites a shoe distribution center that includes an order receiving unit that receives orders from customers for footwear to custom fit the customer, wherein each order identifies at least one last. Nothing in Wolven teaches or remotely suggests an order receiving unit that receives orders for custom footwear that include identification of a last to be used in producing the footwear. Notably, the Office Action does not specifically address this claimed feature.

Applicants' claim 10 further recites a shoe distribution center that includes a footwear inventory containing a plurality of pieces of footwear in a variety of sizes. The claim further recites that an interior of the footwear incorporates a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear's original lengths and widths. Wolven does not teach or suggest these claimed features. The Office asserts that the "inventory" of Wolven constitutes the stored "information on the individual." See the March 12, 2007, Office Action at page 2. Applicants respectfully submit that this "information on the individual," as identified by Wolven, does not correspond to the "inventory" recited in Applicants' claim 10. Specifically, claim 10 recites that the inventory constitutes "a plurality of pieces of footwear in a variety of sizes," e.g., the items available for sale or distribution in response to the orders received via the order receiving unit. Nothing in Wolven's "information on the individual" constitutes any item available for sale or distribution in response to an order.

Even if considered "inventory," the "information on the individual" described by Wolven still would not correspond to the features recited in Applicants' claim 10. Claim 10 further recites that the footwear in the inventory includes a moldable fit-component that allows that piece of footwear to be remolded to lengths and widths differing from that piece of footwear's original lengths and widths. Absolutely nothing in Wolven teaches or suggests that the asserted "inventory" (i.e., the "information on the individual") or any other feature of the Wolven system includes a moldable fit-component that allows any object to be remolded to different sizes.

Finally, nothing in Wolven teaches or suggests a footwear distribution center that includes a footwear manufacturing unit as recited in claim 10. More specifically, Applicants' claim 10 recites using the last(s) identified in the orders received by the order receiving unit for remolding the lengths and/or widths of pieces of footwear in the footwear inventory. Wolven does not teach or remotely suggest any remolding capabilities of this type. Notably, the Office Action does not specifically address this claimed feature.

Applicants' claim 11 also patentably distinguishes from the cited art. Claim 11 depends from claim 10 and further recites that the footwear manufacturing unit of the claimed shoe distribution center includes: (a) a last inventory containing a plurality of lasts that can be used to remodel lengths

or widths of at least some of the pieces footwear in the footwear inventory; and (b) a heating unit for heating the lasts to remold lengths or widths of at least some of the pieces footwear in the footwear inventory. Again, Wolven does not teach or suggest these claimed features, and even more notably, the Office Action does not address these claim features. The Office Action simply concludes that the claim is obvious without any evidentiary support.

In view of the foregoing, Applicants respectfully submit that claims 10-14 patentably distinguish from Wolven. Withdrawal of the rejection and allowance of these claims are earnestly solicited.

If the Examiner believes that an interview will facilitate advancement of the prosecution of this application, he is invited to contact the undersigned attorney by telephone.

Applicants respectfully request a three month extension of time for responding to the outstanding Office Action. If any additional fees are required, such as fees under 37 C.F.R. §§ 1.16 or 1.17, or if an additional extension of time is necessary that is not accounted for in the papers filed with this Response, the Commissioner is authorized to debit our Deposit Account No. 19-0733 for any necessary fees, including any necessary extension fees or other fees needed to maintain the pendency of this application.

All rejections having been addressed, Applicants respectfully submit that this application is in condition for immediate allowance and respectfully solicit prompt notification of the same.

Respectfully submitted,

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**Related Proceedings Appendix (37 C.F.R. § 41.37(c)(1)(x))**

None, as noted in Section (ii) above.